

User's Guide **8** to:
Phoenix Vessel Technology Limited

300, 450, 600 psi Side port pressure vessels
(1.5", 2.0", 2.5", 76mm, 3.0"). Model numbers: 1908, 3342, 3348,
3648, 3649, 3312, 3605, 3603, 3641, 3615.

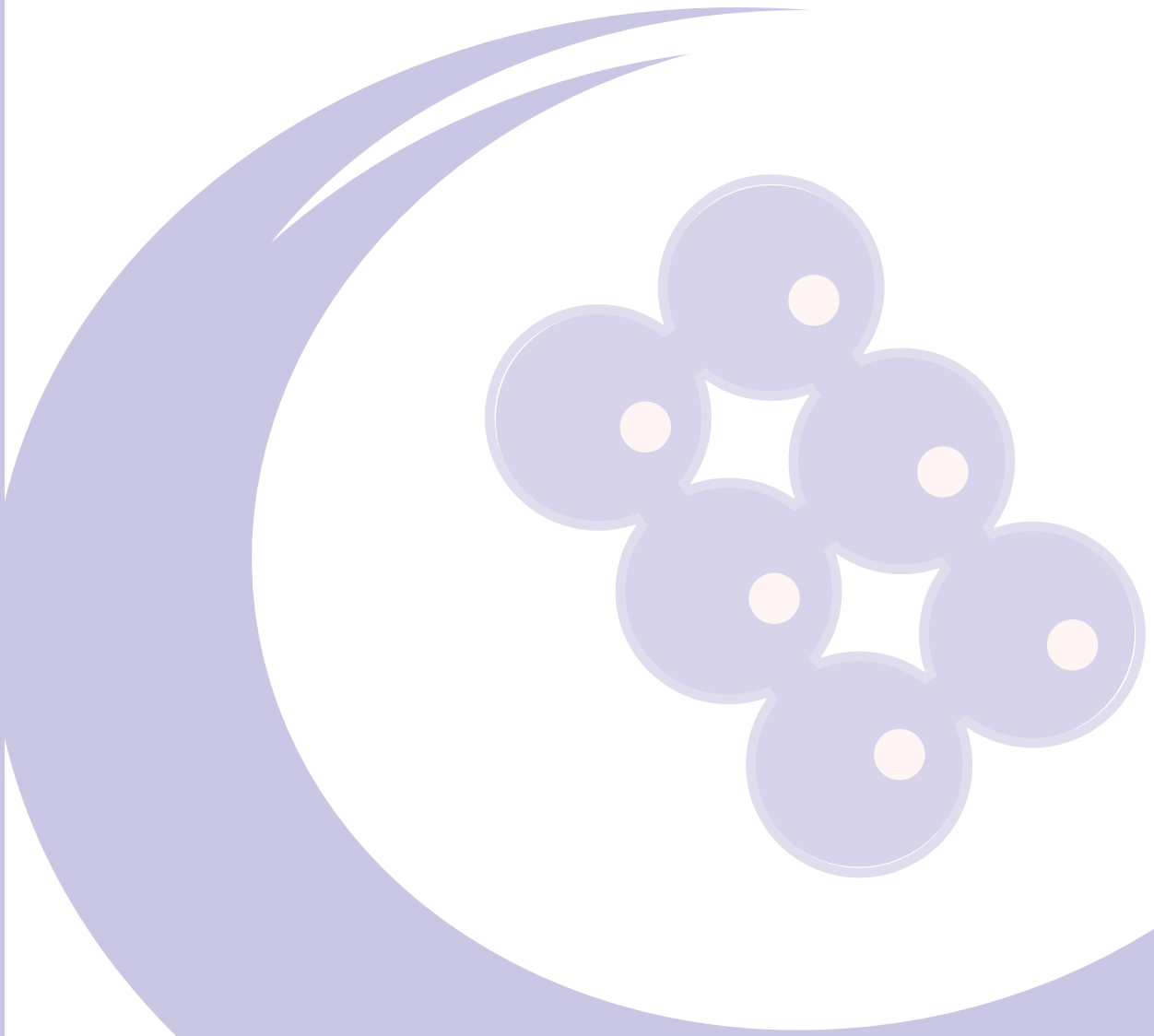


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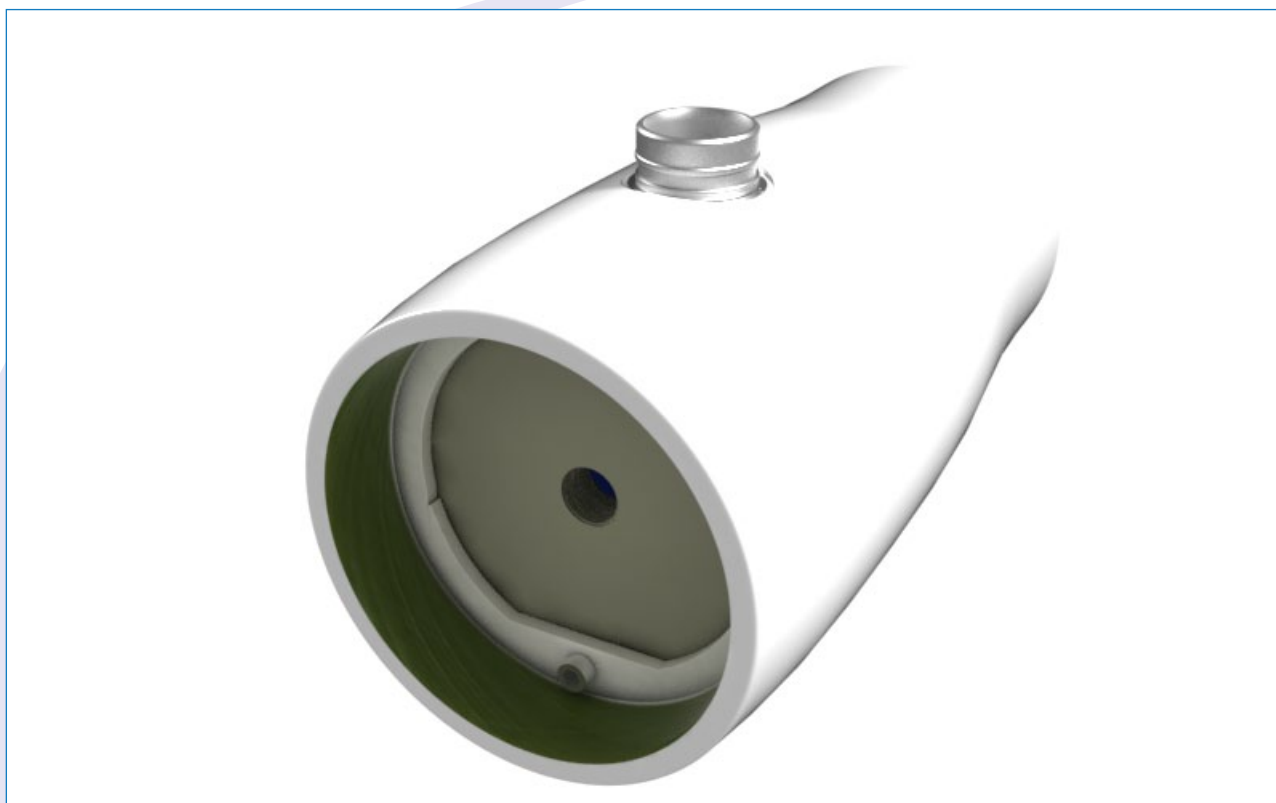
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FORWARD

Phoenix Vessel Technology is a major manufacturer of Glass Reinforced Plastic Pressure Vessels which are used as housings for reverse osmosis membrane elements. It is one of a small number of companies with Code X accreditation of the American Society of Mechanical Engineers.

Vessels are produced to cover a range of pressures upto 1200 psi and to house seven 40" or five 60" membrane elements.

Each vessel has a documented history in terms of the manufacturing process and the materials used. Before despatch, each vessel is tested to 1.1 times working pressure to ensure structural integrity.



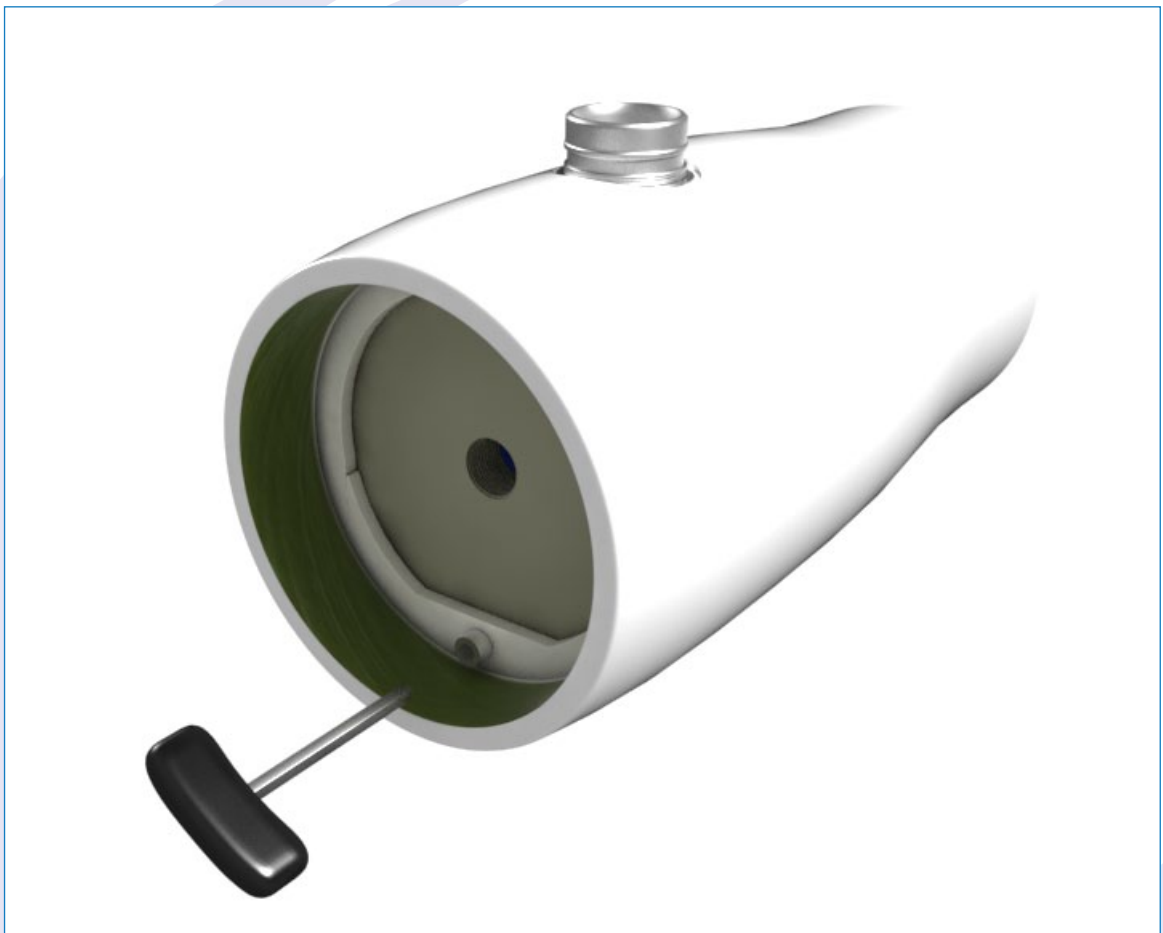
This User's Guide applies to the series of 8" Side Ported pressure vessels which have a 1" female product tube connection. The following Assembly Drawings are applicable :

- (1) 1MNC 1908 - 8" 300 psi Model
- (2) 1MNC 3648 - 8" 300 psi Model
- (3) 1MNC 3649 - 8" 300 psi Model
- (4) 1MNC 3342 - 8" 300 psi Model
- (5) 1MNC 3348 - 8" 300 psi Model
- (6) 1MNC 3312 - 8" 450 psi Model
- (7) 1MNC 3605 - 8" 450 psi Model
- (8) 1MNC 3603 - 8" 450 psi Model
- (9) 1MNC 3641 - 8" 450 psi Model
- (10) 1MNC 3615 - 8" 600 psi Model

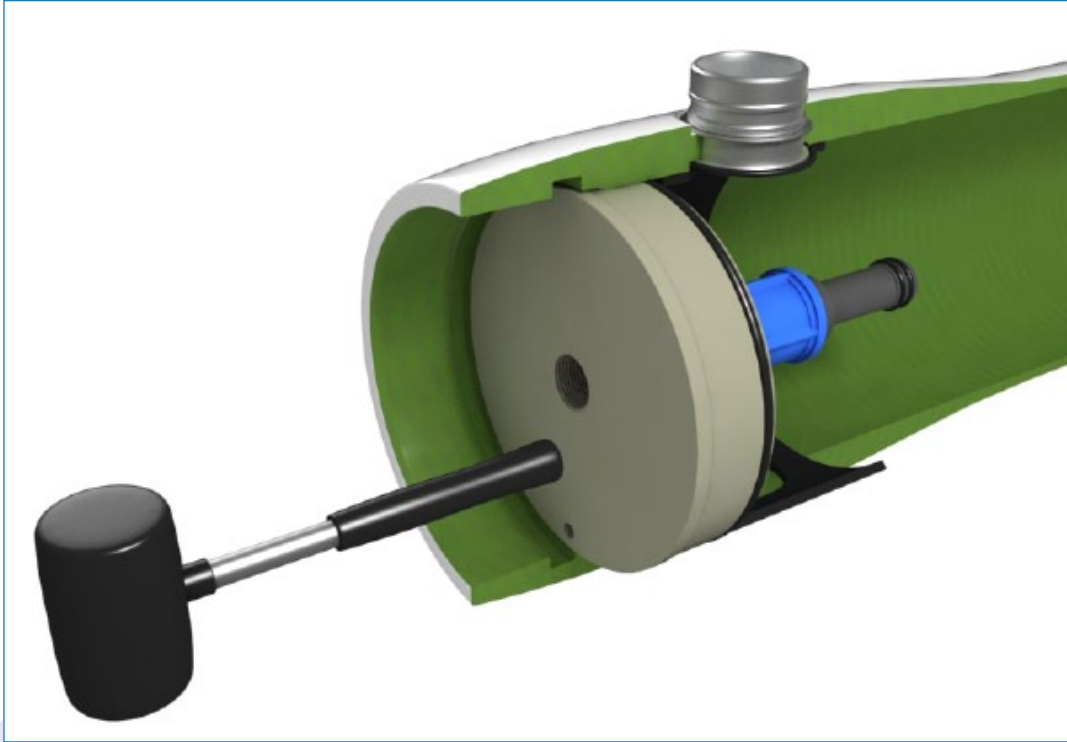
SECTION ONE MAINTENANCE GUIDE

1.1 REMOVING END CAP FROM VESSEL

- 1.1.1 Ensure system is NOT pressurised before starting work.
- 1.1.2 Remove connections if fitted from the central product port.
- 1.1.3 Using an 8mm hexagonal T bar or Allen key remove the caphead screw located in end of the vessel.



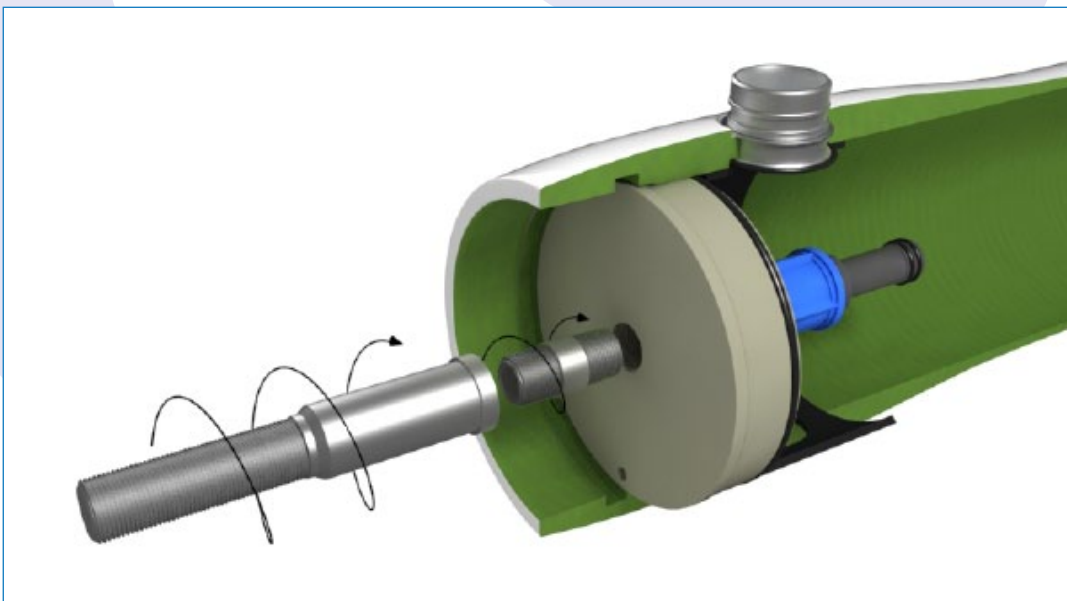
- 1.1.4 Remove the 3 segment retaining rings .If removal is difficult then start at the point where the gap between two segments is greatest. It may be of assistance to tap the backing plate with a wooden hammer shaft to free the segments.



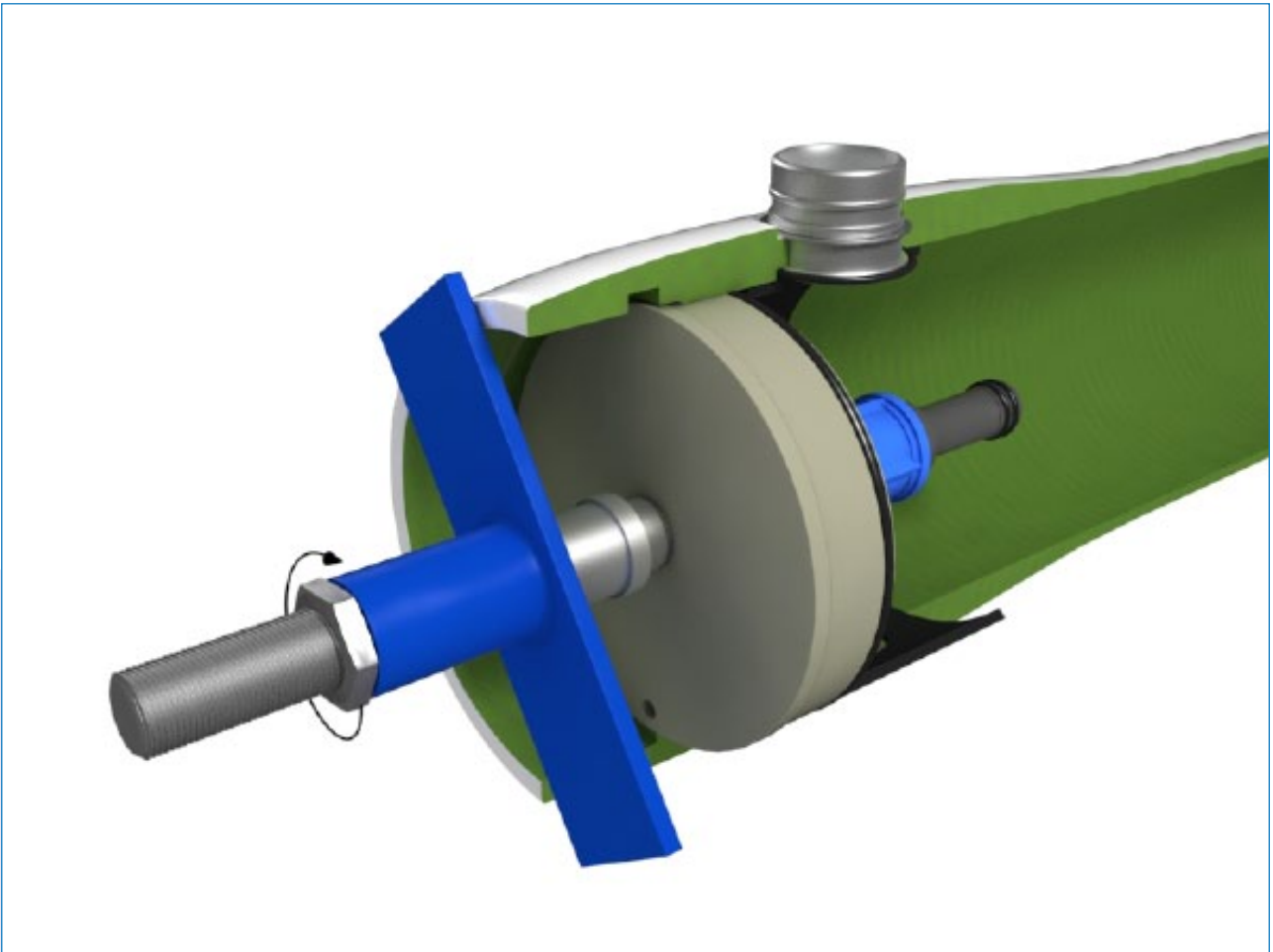
1.1.5 To remove the end cap will require an extractor. This is in three parts:

- (1) PVC Connector - this is threaded to fit the vessel end cap.
- (2) Bridge piece.
- (3) PVC nut to apply extraction load.

Screw the PVC connector onto the product tube thread termination. Grasp the remaining threaded portion of the connector (gloves or a cloth are recommended to protect hands) and pull with a gentle rocking motion.

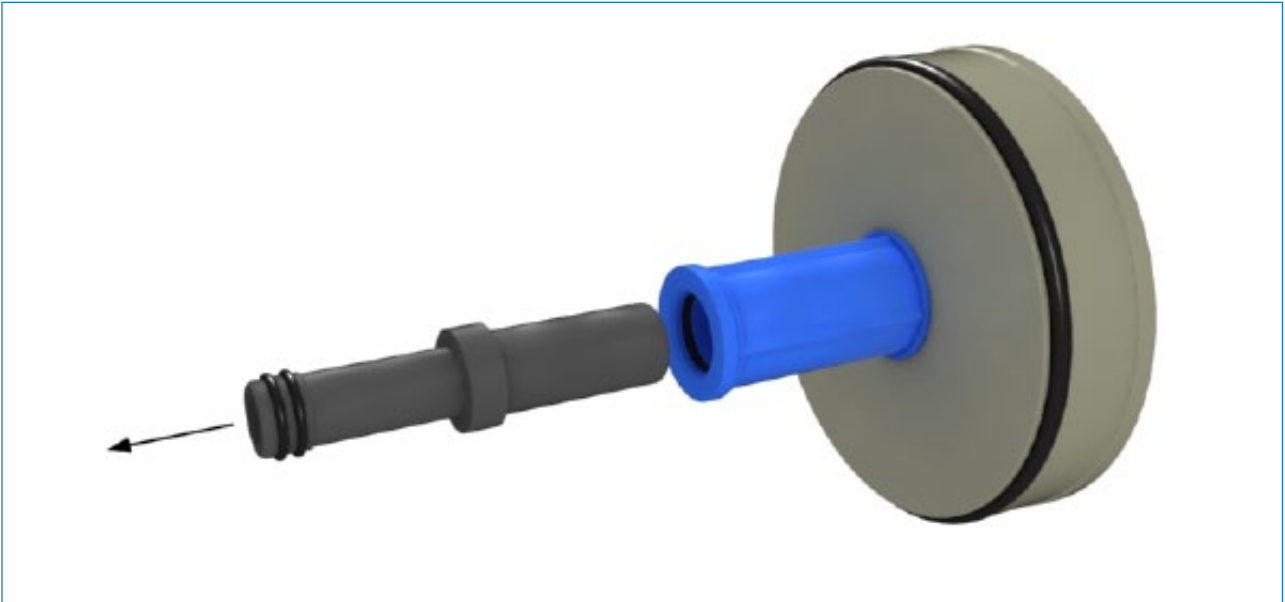


- 1.1.6 If the end cap cannot be removed as indicated above then slide the metal bridge over the connector and use the PVC nut to apply extraction load.

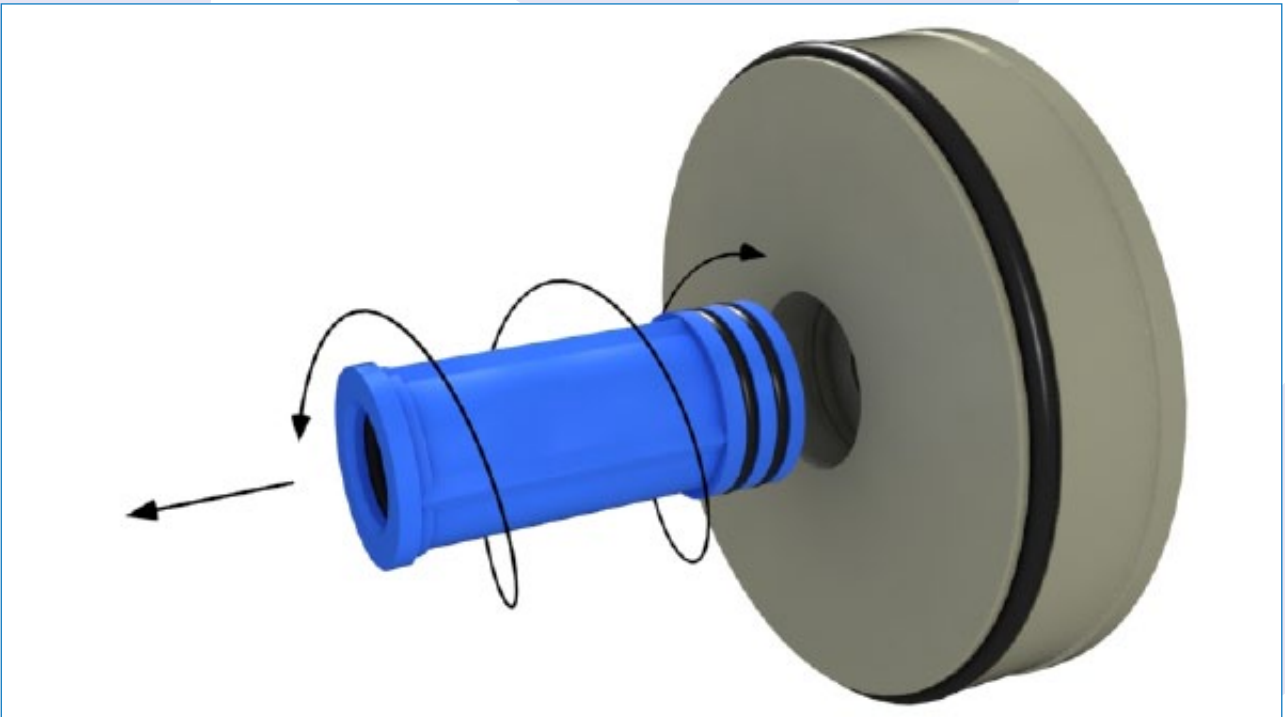


1.2 COMPONENT DISASSEMBLY

- 1.2.1 With the end fitting extracted. Remove the adaptor from the end cap or from the end of the element.



- 1.2.2 The hub to end cap joint should not be broken. However if there is evidence of leakage of feed water into the product line then the hub may be removed from the end cap as shown.



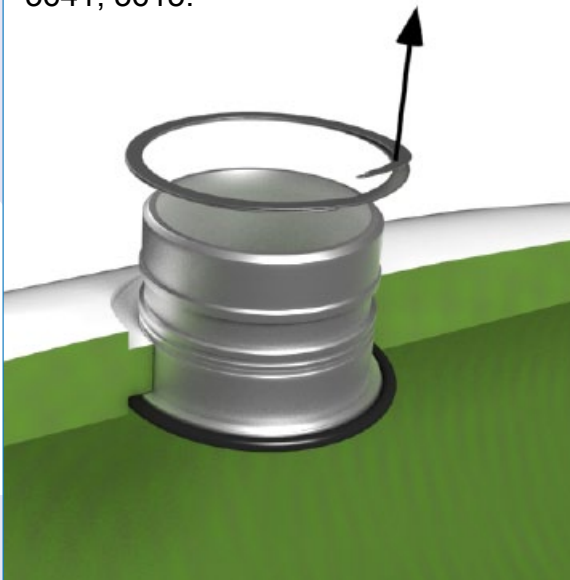
NOTE: Because of the tight fit removing the hub will result in damage to the pair of O-seals. Re place as necessary.

1.2.3 The thrust ring can only be removed by undoing the cap head screws.

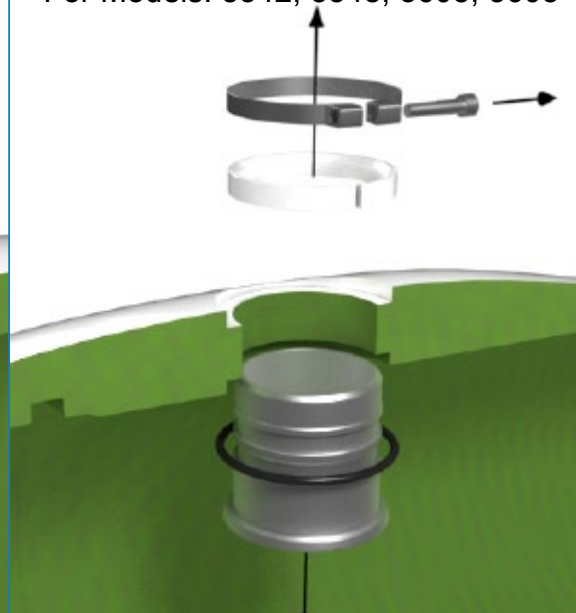


1.2.4 To remove the side port from the vessel the couplings must first be removed and the manifold moved away. Then remove the clamp system holding the side port in position. There are two versions as shown below. If a circlip is used (1.5" and 2" ports) then remove the circlip with the tip of a screwdriver between the recess in the circlip and the body of the port. Remove the circlip using a spiro twist. If a clamp is used (2.5" and 3" ports) then release the clamp using the appropriate screwdriver and remove the plastic collar using a screwdriver to prise the collar apart and out of position.

For Model 1908, 3648, 3649, 3312, 3641, 3615.



For Models: 3342, 3348, 3605, 3603



1.3 COMPONENT ASSEMBLY

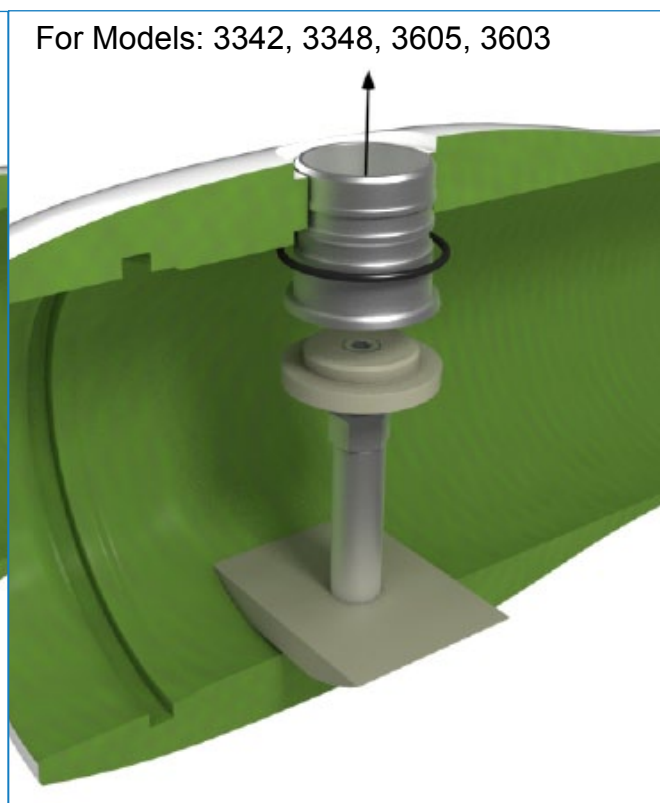
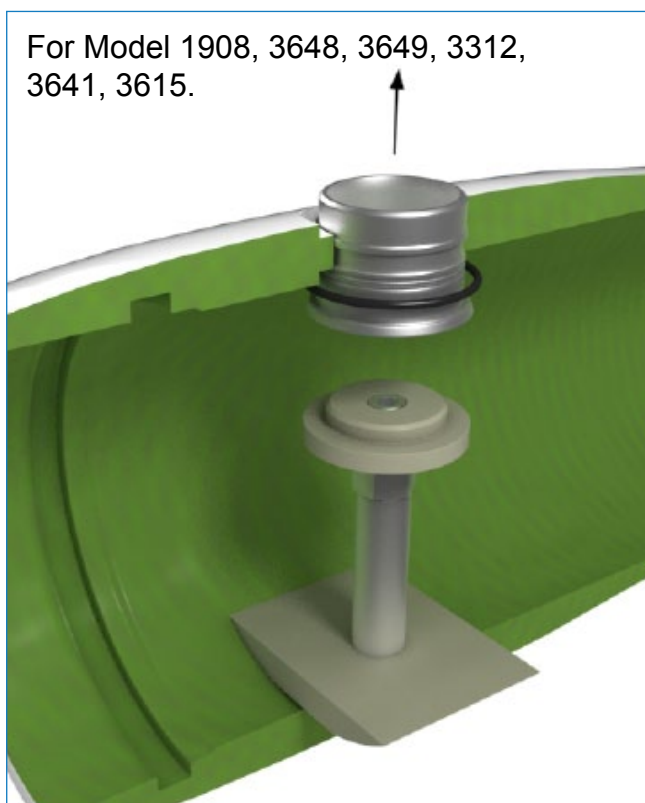
1.3.1 Thoroughly clean all parts and check for the following.

- (a) O-SEALS - cracked, worn or cut areas.
 - (b) SIDE PORT - corroded or distorted.
 - (c) END CAP - Cracks around centre 1" thread, 1" thread form damaged or truncated, outer bearing edges worn, threads for M10 cap head screws damaged.
 - (d) SPIROLOC CIRCLIP - broken or distorted.
 - (e) Retaining Rings – Special Attention should be given to the GRP material. Any signs of wear or damage Replacement Required.
 - (f) CAP HEAD SCREWS - bent, corroded or threads damaged.
 - (g) ADAPTOR - cracks or scratches in sealing areas.
- Components which show any of the above should be replaced.

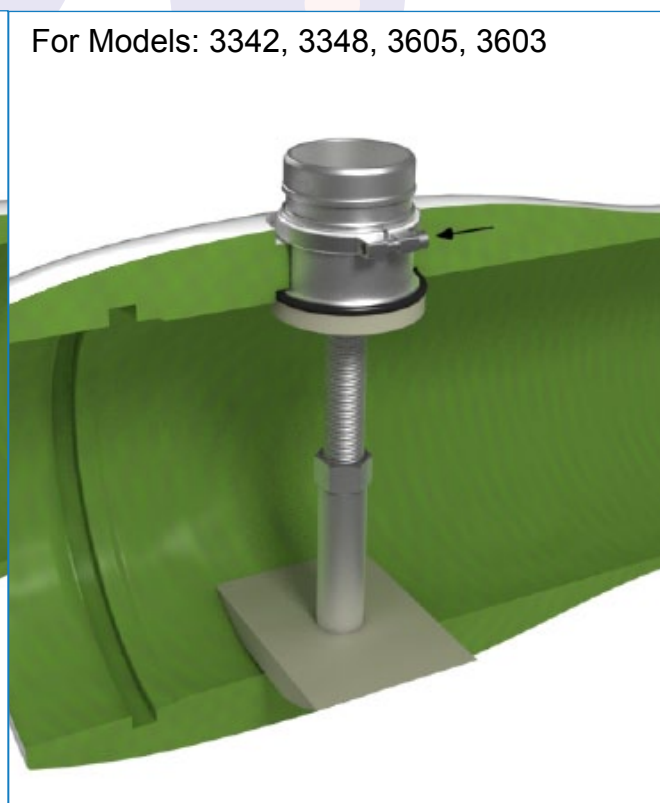
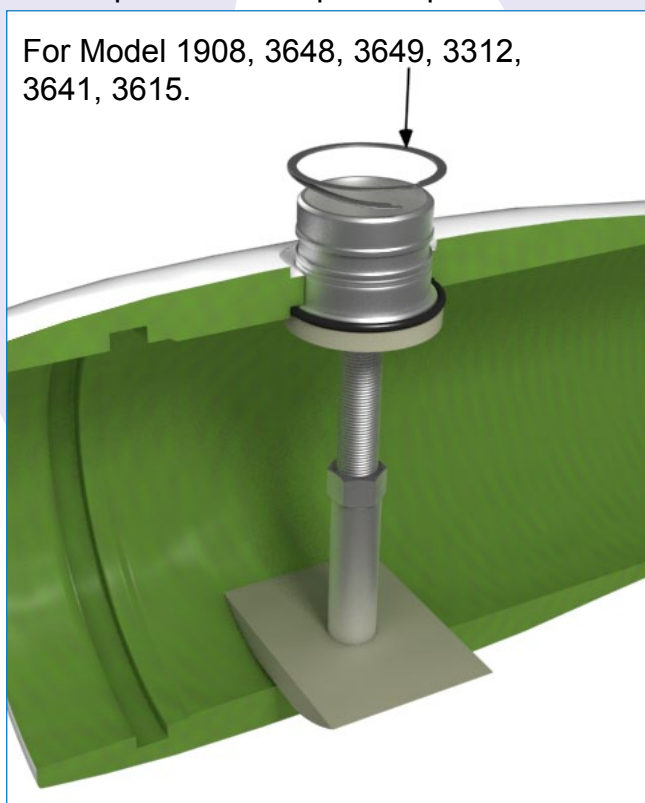
1.3.2 CORROSION - Examine metal components for evidence of corrosion which might affect structural performance.

NOTE: It is recommended that O-seals are replaced every time the end cap is rebuilt.

1.3.3. Examine the sealing surface of the vessel side port. Remove any debris by flushing with water or by using a clean cloth. Stubborn debris which adheres to the sealing surfaces may be removed by lightly polishing with waterproof silicone carbide paper. Use 400 Grade (fine) to start with and finish with 600 Grade (very fine). It will help to moisten the grit paper with water during use. Afterwards remove any debris with water or by using a clean cloth. Apply glycerine lubricant to vessel surfaces and fit the side port into position using the insertion tool shown. This has a small lip on its outer edge which pushes the seal into position without damaging it.

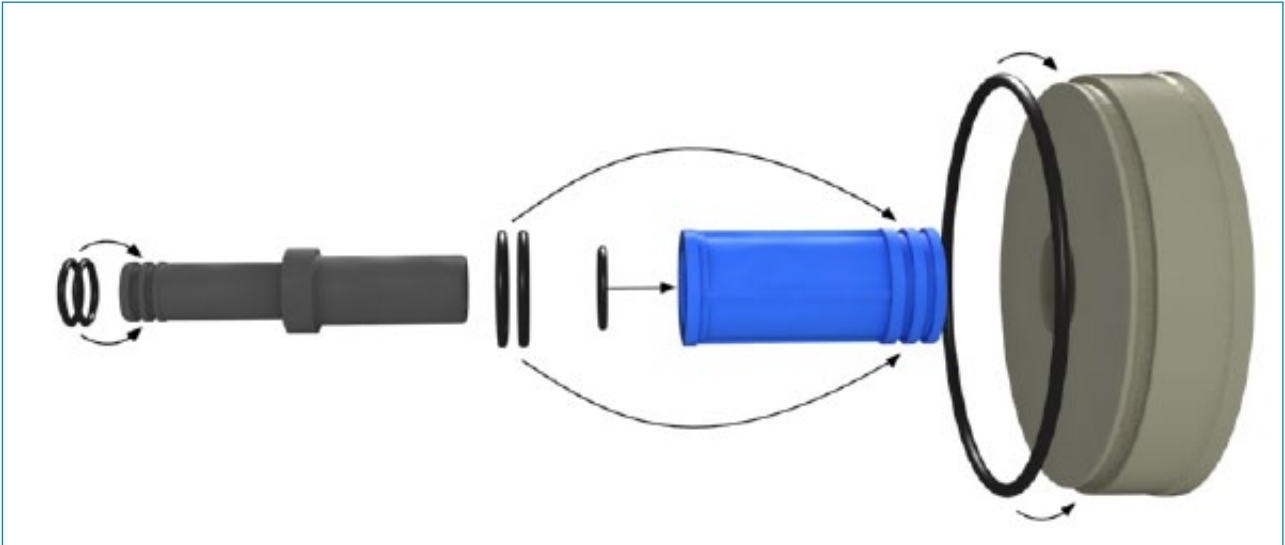


1.3.4 Push the side port fully home using the compression tool until the circlip groove emerges from the vessel port. Carefully fit the spiroloc circlip so that it does not distort (ie aim to fit it into the victaulic groove first before engaging it into the circlip groove). Then wind circlip into it's finla positionposition.

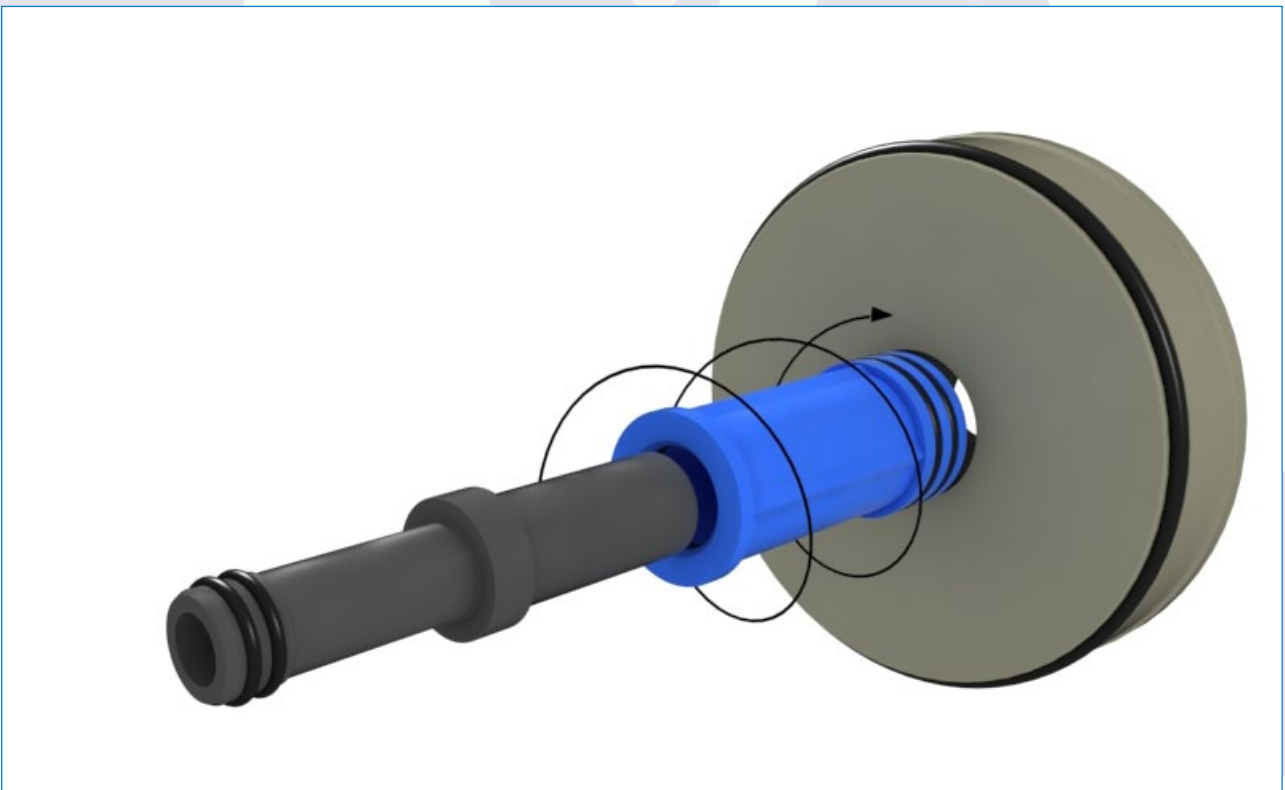


NOTE: Lubricate the O-Seals with Glycerine. Do not use grease as this may impair the performance of the membrane elements.

1.3.5 Fit the O-seals into the grooves in the adaptor hub and end cap.



1.3.6 If the adaptor and hub was removed earlier then lubricate the O-seals with glycerine and push it into the end cap. It will help if the hub is twisted as it is pushed inwards.



1.4 LOADING MEMBRANES

This Section is provided as a Guide only, reference should be made to the element manufacturers recommendations for loading.

1.4.1 UNLOADING MEMBRANE ELEMENTS

- (a) Ensure system is NOT pressurised before starting work.
- (b) Remove both end caps from vessel.
- (c) Remove thrust ring and adaptors from vessel.
- (d) Remove element from vessel following element manufacturers recommendations.

1.4.2 CHECKS BEFORE LOADING

- (a) Check the inside of the vessel for debris which may scratch the vessel. Remove any that is found by flushing with water or by using a clean cloth. Stubborn debris which adheres to the vessel may be removed by lightly polishing the area with waterproof silicone carbide paper. Use 400 Grade (fine) to start with and finish with 600 Grade (very fine). It will help to moisten the grit paper with water during use. Avoid continuously rubbing the same spot in the same direction. Afterwards remove any debris with water or by using a clean cloth.
- (b) Check that there are no sharp edges to the membrane element which could scratch the vessel. Contact the element manufacturer if these cannot be easily removed.
- (c) Check the element brine seal for wear and or cuts. Consult the element manufacturer for spares and advice.

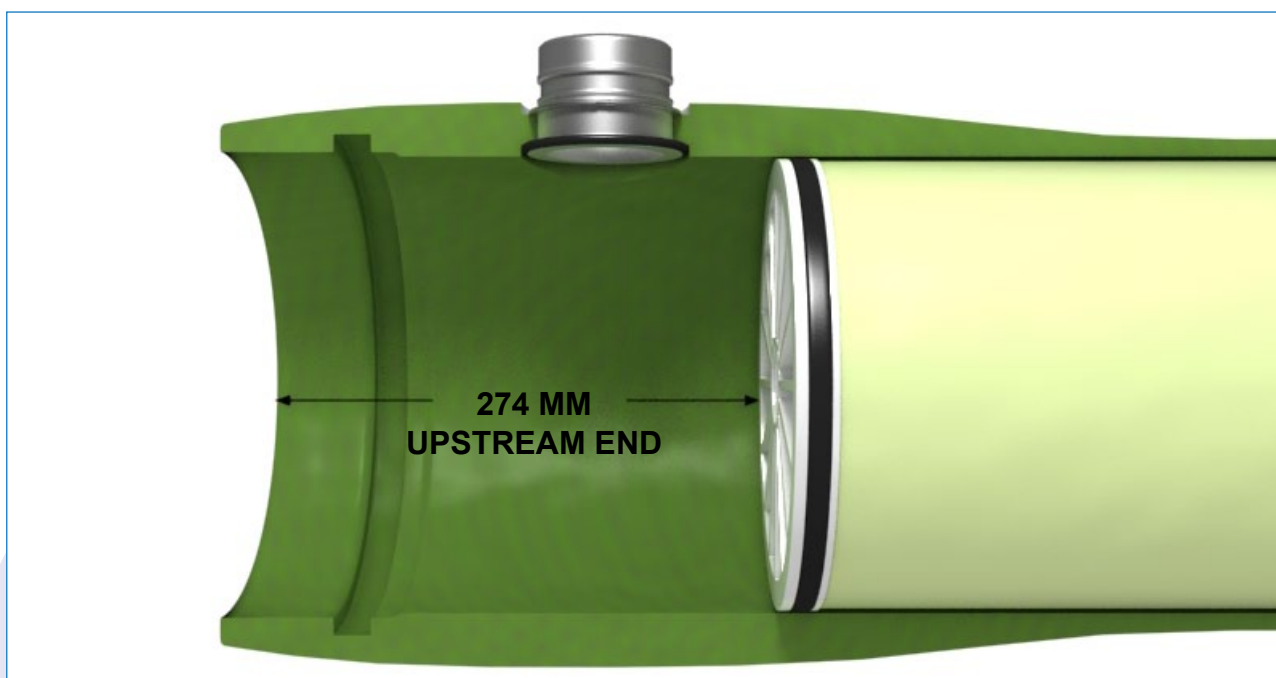
NOTE: Sharp debris may scratch vessel bore. This should be removed before unloading elements.

NOTE: Fine grade Scotchbrite may be substituted for waterproof silicone carbide paper.

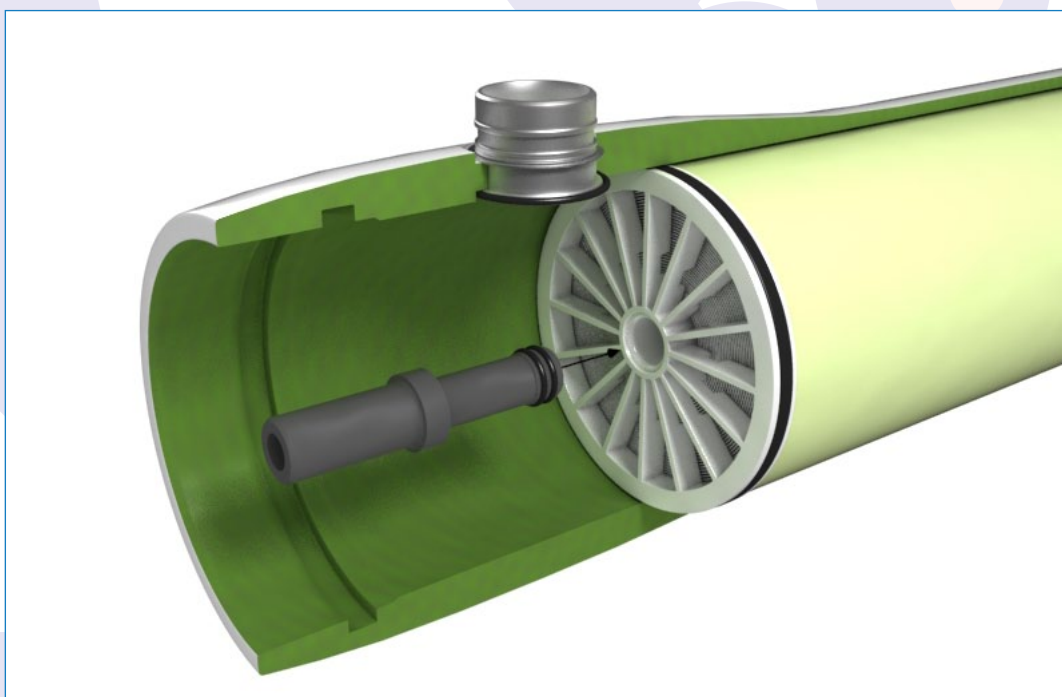
1.4.3 LOADING MEMBRANE ELEMENTS

- (a) Lubricate the inside of the vessel with glycerine. If this is not available then flood vessel with clean water.
- (b) Check with the element manufacturer concerning the position of the brine seal. Normally this is placed on the upstream end of the element with the recessed part of the seal pointing upstream.
- (c) Push the elements into the vessel from the upstream end.

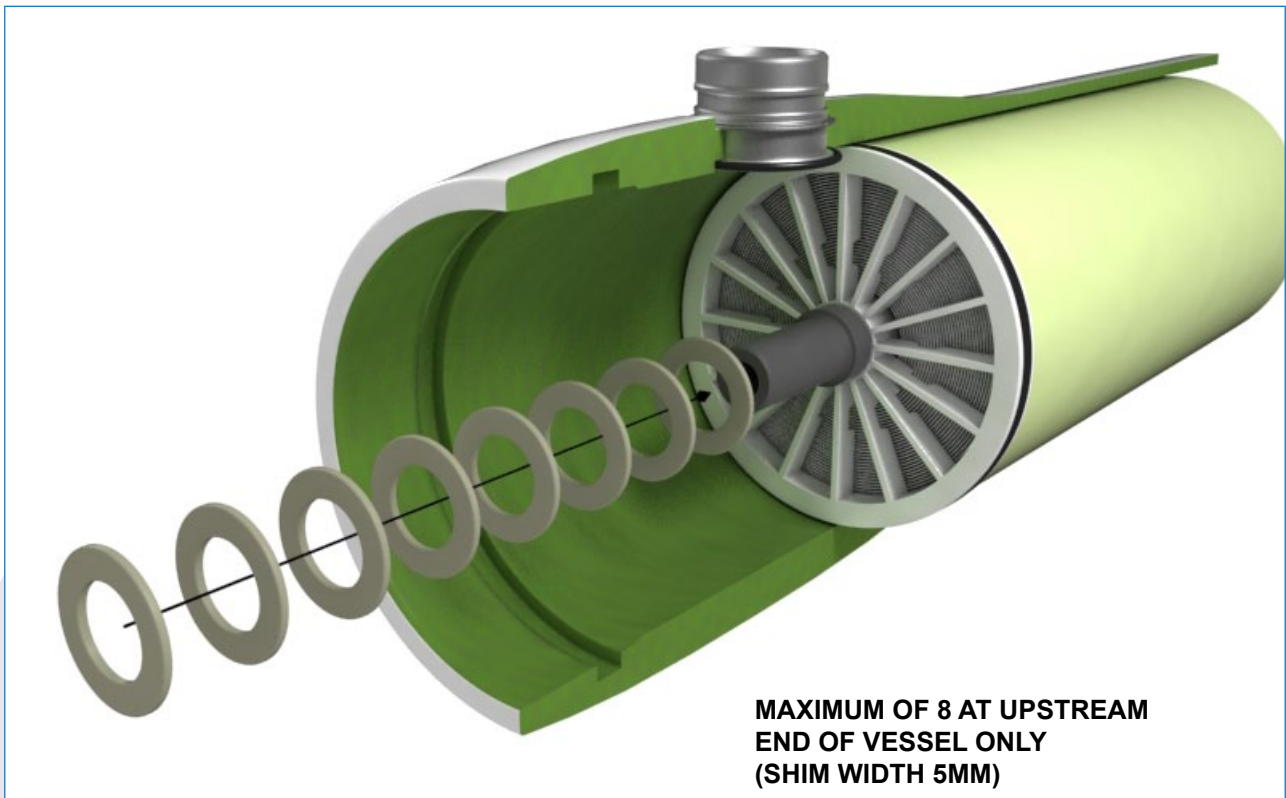
- (d) As each element is loaded insert the interconnector. To ease insertion glycerine should be applied to the O-seals.
- (e) Care should be taken to ensure that the weight of the element is not taken on the interconnectors during loading.
- (f) The final element should be inserted the following distances: MIN 10.8" (274mm) Max 11.7" (297mm) in from the end of the vessel.



- (g) If the elements are pushed too far then continue pushing until the first element emerges from the other end of the vessel. Take care to support its weight as it emerges.
- (h) Fit the adaptors provided with the vessel end cap to the core tube of the elements at both ends



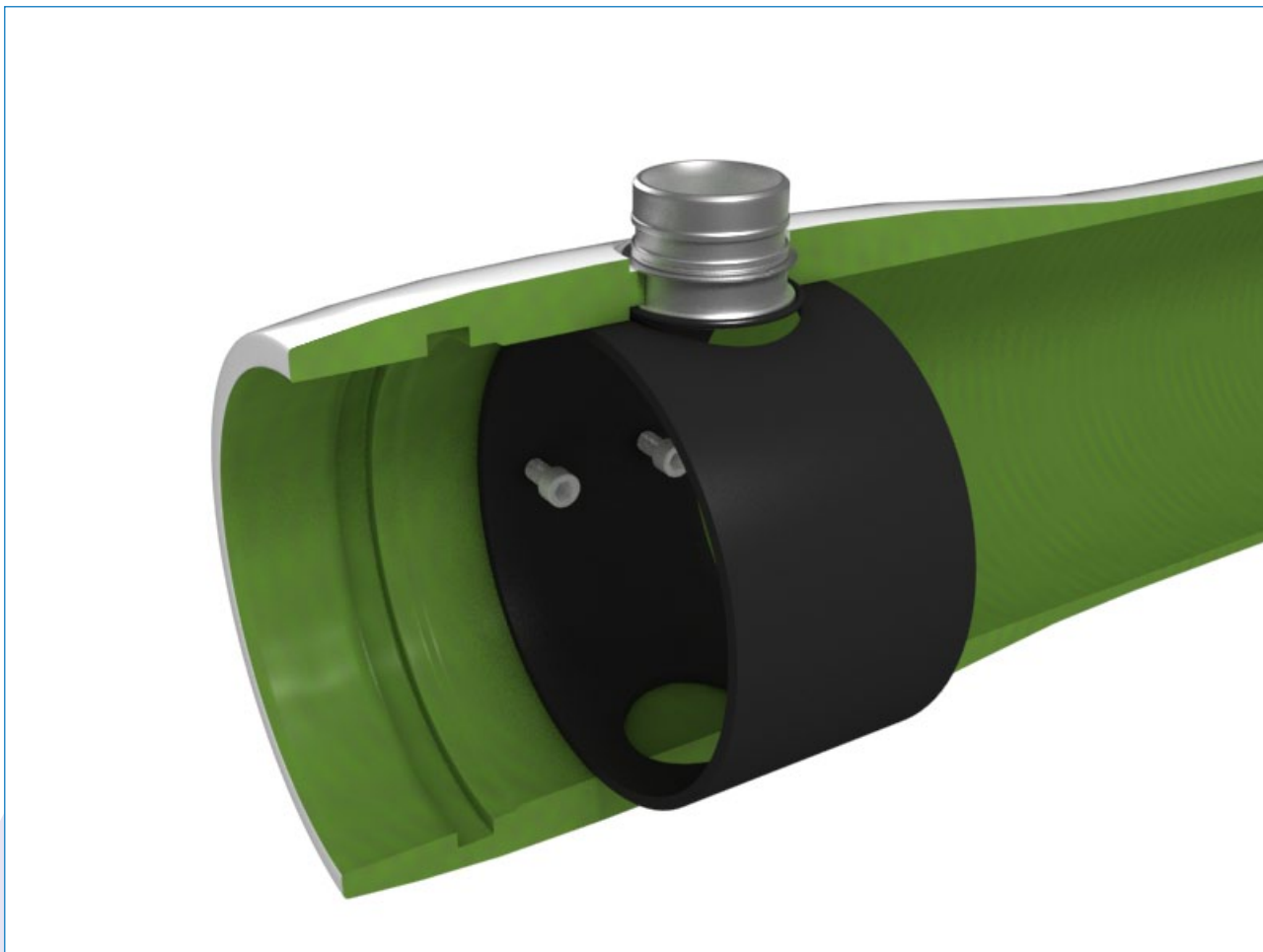
- (i) If the element is of the spigotted type - ie has a core tube which is proud of the face of the element then shims may be required to ensure that the element remains connected to the pressure vessel end fitting. These must be placed between the adaptor and the product tube at the upstream end only - ie at the opposite end to the thrust ring. Shims may be used with any design of adaptor to reduce movement and prolong seal life.



NOTE: Adaptors must be fitted to both ends of the stack of elements. Catastrophic failure of the product line can occur if adaptors are not fitted and pressure is applied.

The required number of shims may vary between any two vessels loaded with elements due to tolerance build up, each will require measuring to find the exact number. The ideal situation is to have a working float of 5 to 10mm at the upstream end of the vessel to allow for future thermal expansion and contraction. The best method of achieving this is to fit the maximum number of shims (8 at 5mm thickness) and to keep subtracting shims one at a time until the retaining ring segments fit into the groove in the vessel. Finally subtract one more shim to ensure a safe float of 5-10mm.

- (h) Normally only one thrust ring is provided per vessel the correct location being at the downstream end of the vessel. The design of adaptor and thrust ring ensures even loading over the face of the element. Push the thrust ring into position and secure it in place with the spring clip and cap head screws. Remember to include the washers under the nut as per the following drawing.



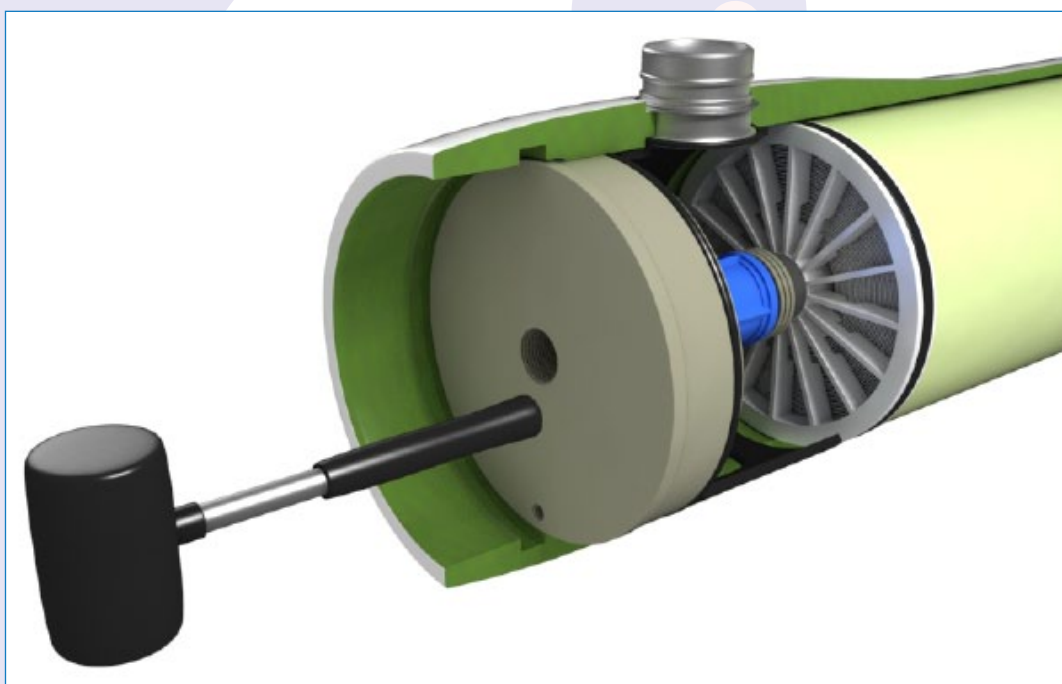
NOTE: Incorrect location of the thrust ring will damage the membrane elements.

NOTE: Please ensure the holes in the thrust ring are aligned with the ports in the vessel.

NOTE: Please ensure plastic screws in thrust ring are tightened sufficiently to avoid movement during operation.

1.5 CLOSING VESSEL

- 1.5.1 Check the inside of the vessel for debris which may scratch the vessel. Remove any that is found by flushing with water or by using a clean cloth. Stubborn debris which adheres to the vessel may be removed by lightly polishing the area with waterproof silicone carbide paper. Use 400 Grade (fine) to start with and finish with 600 Grade (very fine). It will help to moisten the grit paper with water during use. Avoid continuously rubbing the same spot in the same direction. Afterwards remove any debris with water or by using a clean cloth.
- 1.5.2 Lubricate the vessel inside surfaces with glycerine.
- 1.5.3 Lubricate the assembled end cap with glycerine, particularly the large 8" diameter O-seal.
- 1.5.4 Insert the end cap squarely into the vessel body sufficient to allow the segmented retaining rings to be inserted fully into the groove in the end of the vessel. If the end fitting is difficult to push into the vessel then use the wooden shaft of a hammer to tap it into position.



NOTE: Fine grade Scotchbrite may be substituted for waterproof silicone carbide paper.

NOTE: Do not use excessive force to insert the end cap. A light tap is sufficient.

If the end cap cannot be easily inserted then the following checks should be carried out

- (i) Lubricate vessel surfaces with more glycerine and try again.
- (ii) The elements may have been pushed too far, proceed as follows:

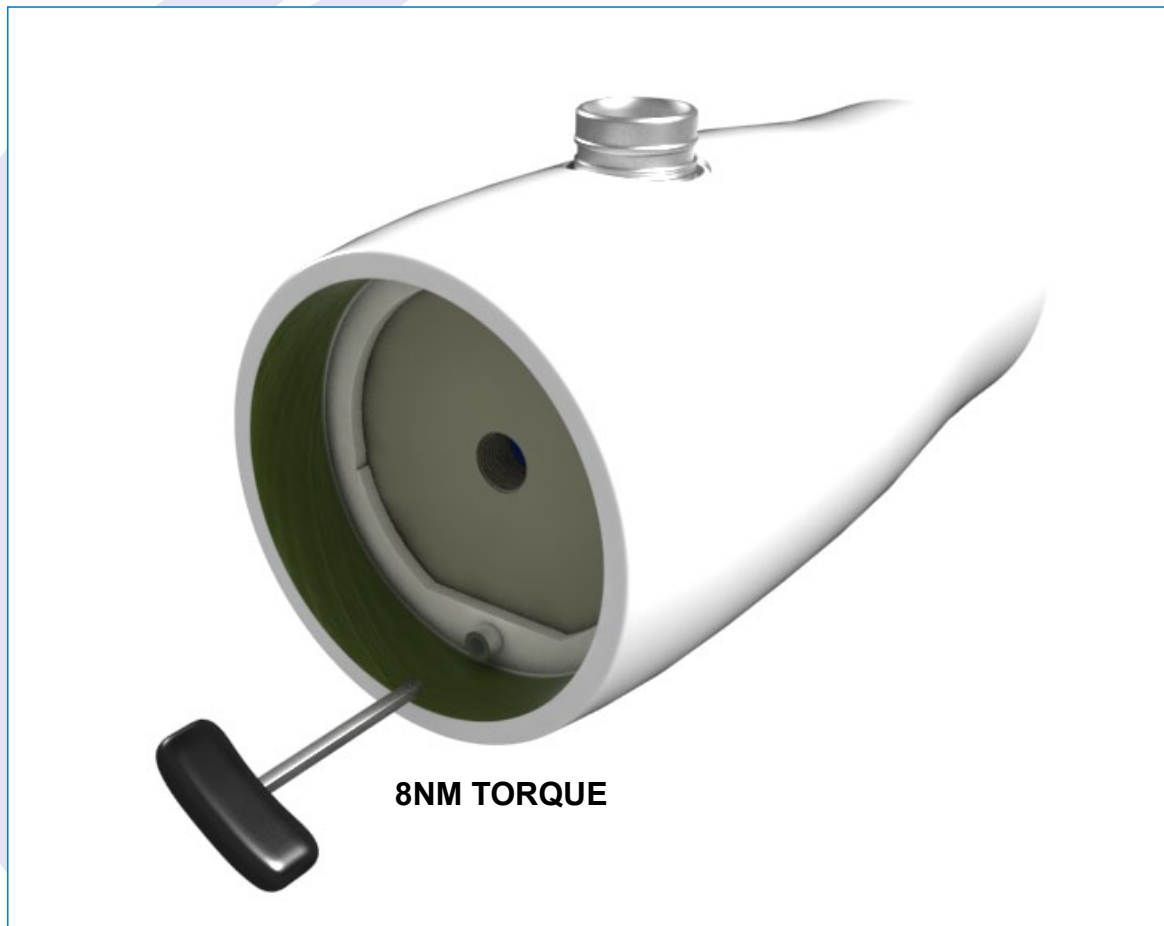
Remove large 8" diameter seal from end cap.

Remove adaptor from element.

Remove small external O-seal from adaptor and insert into end cap.

- (iii) Without the O seals no effort should be required to insert the end cap, if there is still insufficient space to insert the retaining rings then the elements have been pushed too far during loading. Remove the last element by pushing it through the vessel taking care to support its weight as it emerges. Refer to Section 1.4 'Loading Membrane Elements' for further information.

1.5.5 With the end fitting in place insert the two identical segments with the short sides together at the 12 o'clock position then fit the segment containing the hole by sliding downward and between the other two. Fix with the caphead screw, by aligning with the hole in the end plate. **Must be tightened to 8 Nm**



NOTE: Remember to refit all O-seals, thrust ring and insert adaptors into the central core tube of the first and last element in the stack.

NOTE: A partially or badly assembled pressure vessel is dangerous. Carry out visual inspection on vessel to check compliance with these instructions. Check working area for any items left unassembled

SECTION TWO

INSTALLATION

2.1 HANDLING

2.1.1 Vessels may be stored horizontally in any warehouse where the temperatures are as follows:

Maximum 45° C (113° F)

Minimum 0° C (32° F)

2.1.2 DO NOT subject the vessel to sharp blows or impacts as this may damage the vessel wall.

2.1.3 DO NOT use the ports which project beyond the vessel as lifting or manoeuvring aids.

2.1.4 DO NOT scratch the vessel inside wall.

2.1.5 Slings wrapped around the vessel wall and suspended from the forks of a fork lift truck are safer and more stable than using forks alone.

2.1.6 Forks should always be padded before being brought into contact with any part of the vessel body.

VESSEL DAMAGE

This should be reported to the shipping company and Phoenix Vessel Technology Limited.

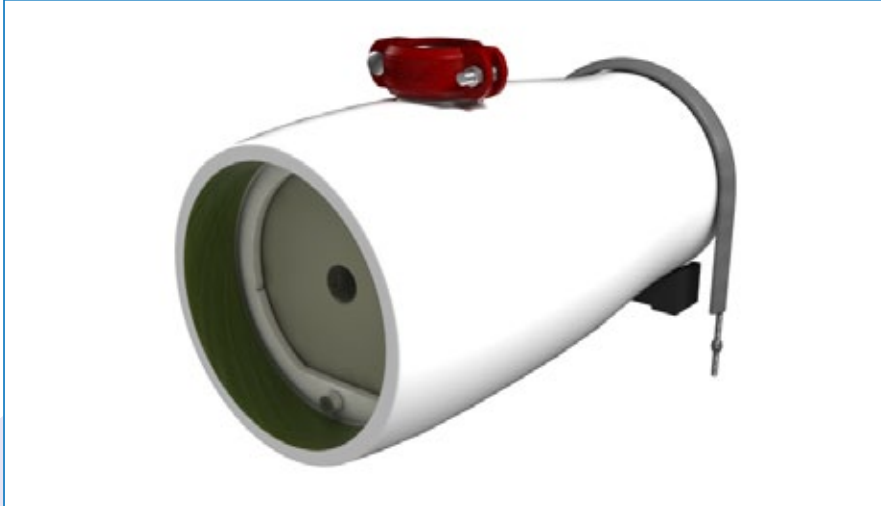
2.2 VESSEL SUPPORT POSITION

The bending stresses generated in a long pressure vessel can be considerable and should not be ignored. Careful choice of support position can minimise bending stresses to an acceptably low level. Always follow instructions stated on the Assembly Drawing for each particular vessel design and length ordered.

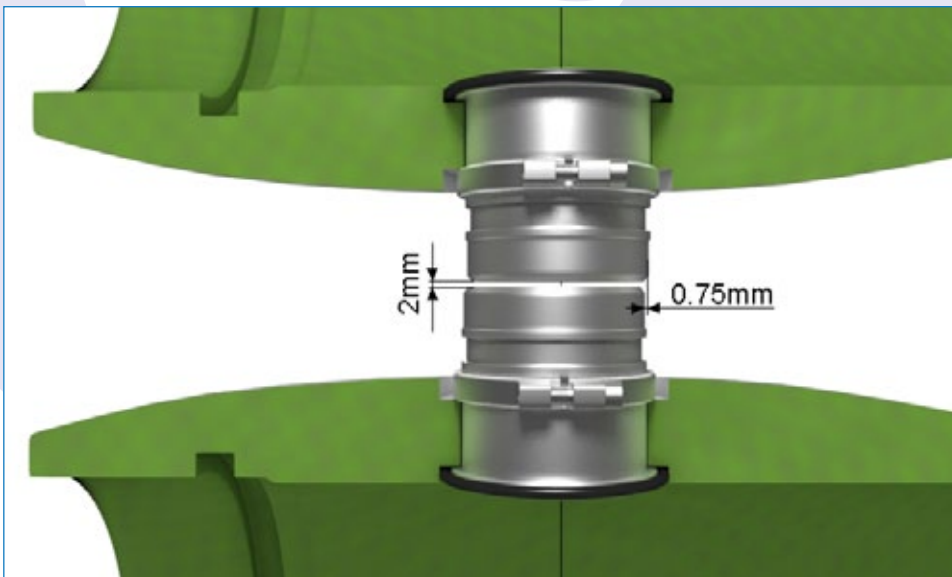
No. of 40" Elements	No. of Supports	Distance rtween Supports (mm)		Distance between Outer Supports (mm)	
		Max	Min	Max.	Min.
1	2	740	500		
1.5	2	1250	500		
2	2	1750	500		
3	2	2775	960		
4	2	3190	1970		
4.5	2	3375	2480		
5	3	centre support		3560	2990
6	3			4020	3800
7	3			6170	5090
7.5	3			6220	5330

2.3 CONNECTIONS TO VESSEL

- 2.3.1 Mount vessels using support saddles provided on horizontal surface at the recommended support position and tighten straps to eliminate movement, do not tighten to more than drawing recommended torque.



- 2.3.2 Provide pressure relief device. This should be set to no more than 105% of design pressure.
- 2.3.3 Allow for an expansion of 0.5mm per metre length of vessel at design pressure.
- 2.3.4 Victaulic clamps used for connection to vessel should be assembled tightly with bolt pads of clamp halves metal to metal.
- 2.3.5 It is recommended that two Victaulic couplings are used to connect the vessel to the manifold ie there is an intermediate pipe section between vessel and manifold which can take up vessel or manifold movement. This intermediate pipe section should be at least 4" in length. The vessel thermal expansion is typically 25×10^{-6} per C in the length direction.



NOTE: Excessive torque applied to the straps may damage the vessel wall and cause the strap nut to seize onto the threaded portion.

SECTION THREE

OPERATION

3.1 CORROSION

- Operational pH level 3 - 10
- Cleaning only pH level 2 - 12 for no longer than 30 mins. Immediately clean down & purge.

Whilst every effort has been taken to ensure that end fittings have adequate corrosion resistance it is the responsibility of the purchaser to assess that the materials offered are suitable for the specific corrosion environment.

Alternate materials are available with enhanced corrosion resistance, contact Phoenix Vessel Technology Limited for advice.

End fittings should be maintained dry and free from corrosion. Vessel leaks should be investigated and corrected.

3.2 OPERATING CONDITIONS

DESIGN SPECIFICATION

Internal Diameter:	To fit any 8" nominal diameter element.
Length:	Up to 300" of membrane elements.
Working Fluid:	Water (brackish).
Design Pressure:	300 psi (20.7bar).
Test Pressure:	1.1 times design pressure for upto 15 minutes maximum.
Design Temperature:	20 to 113 ⁰ F (-7 to 45 ⁰ C).
Expansion:	0.5 to 0.6 mm per metre length of vessel at design pressure.
Vacuum condition:	Down to -14.5 psi (0 bar absolute).
Support Position:	2 supports for 1 to 4.5 (40") elements. 3 supports for 5 to 7.5 (40") elements and any length supported outside of the recommended support range (refer to 'Vessel Support Position' Section 2.2 this User`s Guide).

NOTE: The standard materials of construction may not be compatible with cleaning and preserving fluids. Alternative materials are available on request.

NOTE: The vessel should not be allowed to freeze solid. This will damage the vessel wall and make replacement necessary.

3.2 SAFETY PRECAUTIONS

Fibreglass reinforced pressure vessels will provide years of safe service if properly installed and maintained. This section is for guidance only and should be used in conjunction with the recommendations in the previous sections. Attention is drawn to the 'NOTES:' located at the bottom of the page which highlight potential problems areas and safety recommendations.

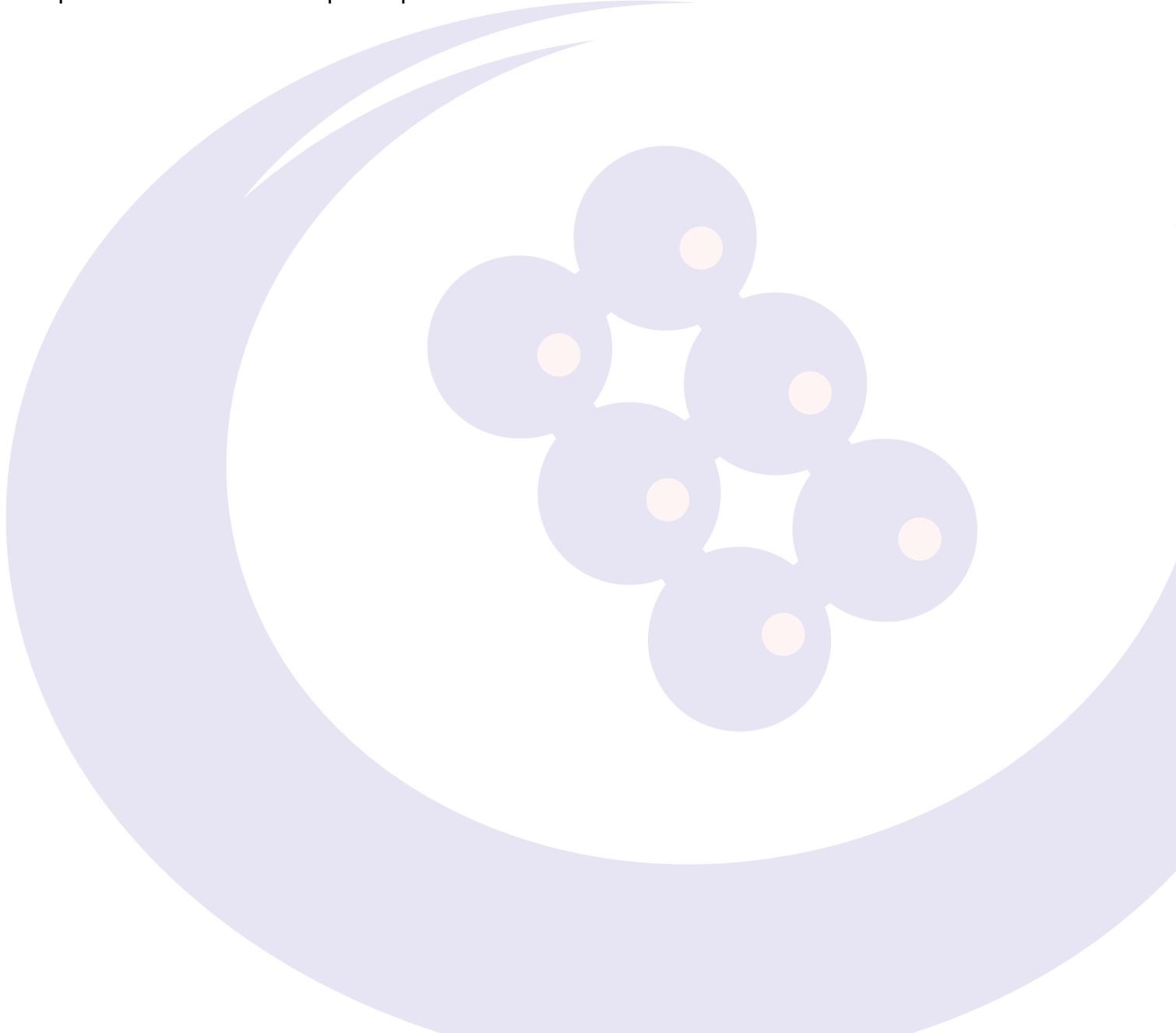
- 3.2.1 Provide pressure relief device. This should be set to no more than 105% of design pressure.
- 3.2.2 Before pressurisation visually check that the segmented retaining rings are in position and secured by the three cap head screws and that the backnut is fitted and is screwed up tightly.
- 3.2.3 DO NOT stand in line of end fitting while pressurisation takes place.

SECTION FOUR

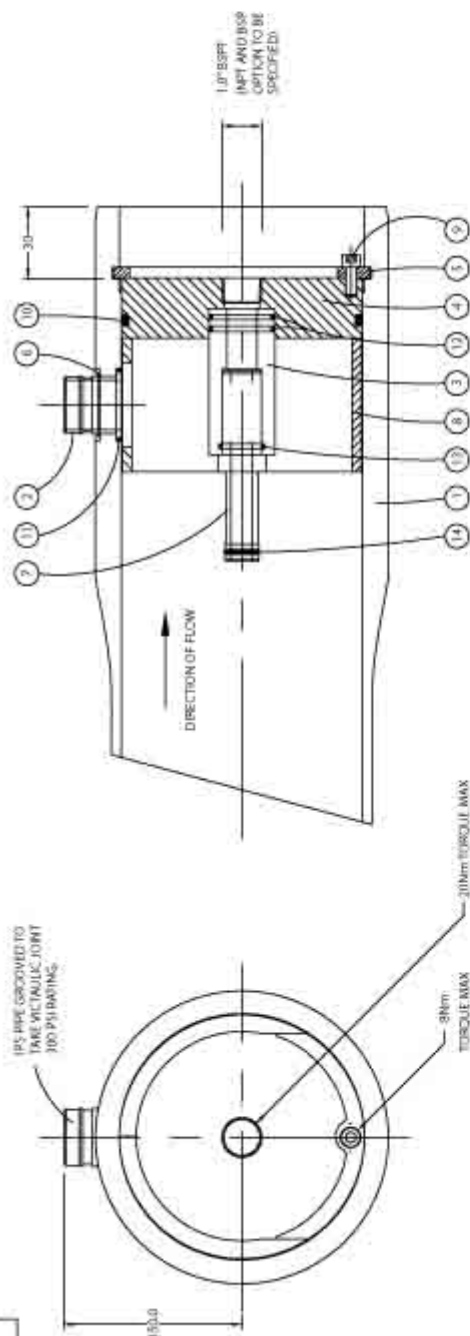
APPENDIX

4.1 SPARE PARTS LIST

For part numbers and descriptions please refer to the relevant Technical Information Sheet.

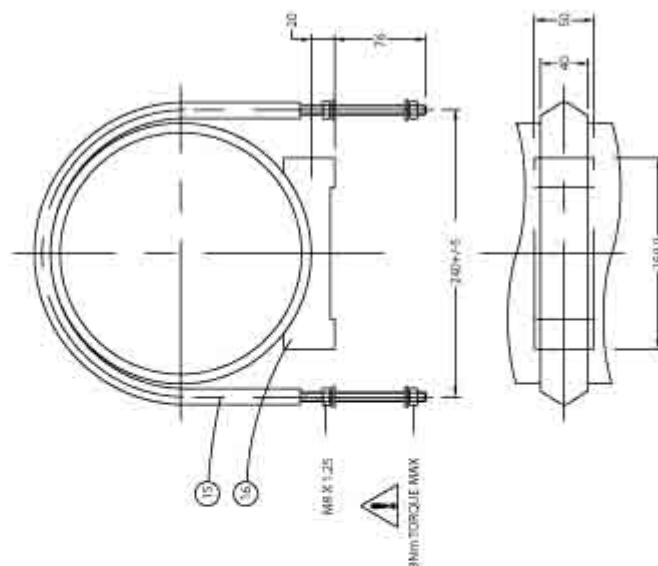


IPS PIPE GROOVED TO
TAKE VITALLIC JOINT
300 PSI RATING.



NOTES:

1. OXICERME TO BE USED ON 1\"/>



SIZE	PORT TO PORT LENGTH +/- 1 MM	MAX SUPPORT POSITION MM	MIN SUPPORT POSITION MM	MAX DRY WEIGHT kg
1.5"	1143	740	500	43
2.0"	1451	1250	800	48
2.5"	2150	1750	900	53
3"	3175	2775	960	64
4"	4191	3790	1070	75
5"	5207	4800	1180	81
6"	6223	5810	1290	86
7"	7239	6820	1400	98
7.5"	7747	7330	1510	115

NO. OF 40\"/>	PORT TO PORT LENGTH +/- 1 MM	MAX SUPPORT POSITION MM	MIN SUPPORT POSITION MM	MAX DRY WEIGHT kg
1.5"	1143	740	500	43
2.0"	1451	1250	800	48
2.5"	2150	1750	900	53
3"	3175	2775	960	64
4"	4191	3790	1070	75
5"	5207	4800	1180	81
6"	6223	5810	1290	86
7"	7239	6820	1400	98
7.5"	7747	7330	1510	115

CENTRAL
SUPPORT REQD

17	NAME/PLATE	MMWL	2
16	SADDLE	URETHANE	2/3
15	STRAP	31T-UPVC	2/3
14	O' SEAL ADAPTOR	EPDM	2
13	O' SEAL HUB/ADAPTOR	EPDM	2
12	O' SEAL HUB/END CAP	EPDM	2
11	O' SEAL FEED PORT	EPDM	2/3/4
10	O' SEAL END CAP	EPDM	2
9	CAP HEAD SCREW	31T-GRACE A4	2
8	THRUST RING	MDCR OR UPVC	1
7	ADAPTOR	UPVC	2
6	SPINDLOCK CIRCLIP	31T-302	2/3/4
5	RETAINING RING SET	3813-36 B 3813-36 C	2
4	END CAP	POLYPROPYLENE	2
3	FLUE	UPVC	2
2	FEED CONCENTRATE PORT	31T-316L	2/3/4
1	UPPER SEAL BODY	2MMK 3201 163 B 2"	1

8\"/>

1MNC 1908

SCALE - NONE

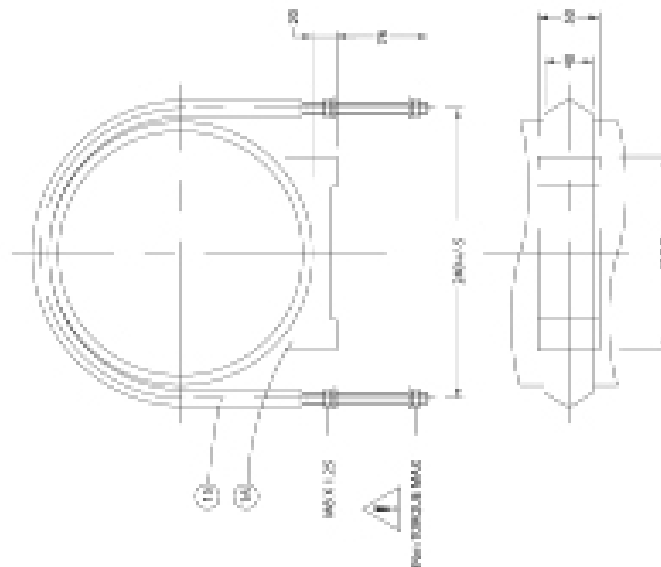
DIMENSIONS IN MILLIMETRES

ISSUE: J

BY: BD

APPD: BD

DATE: 17/05/11



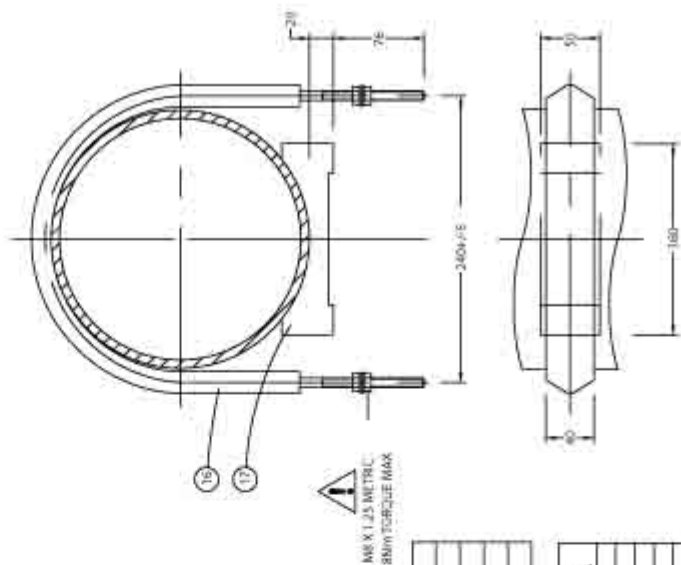
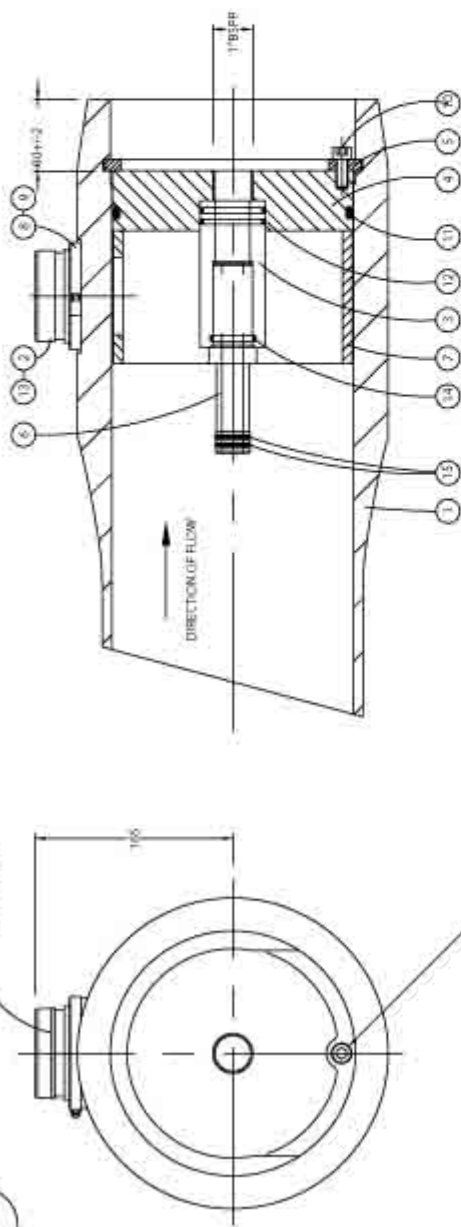
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17	SAFETY	SAFETY	2
18	SAFETY	SAFETY	3
19	SAFETY	SAFETY	4
20	SAFETY	SAFETY	5
21	SAFETY	SAFETY	6
22	SAFETY	SAFETY	7
23	SAFETY	SAFETY	8
24	SAFETY	SAFETY	9
25	SAFETY	SAFETY	10
26	SAFETY	SAFETY	11
27	SAFETY	SAFETY	12
28	SAFETY	SAFETY	13
29	SAFETY	SAFETY	14
30	SAFETY	SAFETY	15
31	SAFETY	SAFETY	16
32	SAFETY	SAFETY	17
33	SAFETY	SAFETY	18
34	SAFETY	SAFETY	19
35	SAFETY	SAFETY	20
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37	SAFETY	SAFETY	22
38	SAFETY	SAFETY	23
39	SAFETY	SAFETY	24
40	SAFETY	SAFETY	25
41	SAFETY	SAFETY	26
42	SAFETY	SAFETY	27
43	SAFETY	SAFETY	28
44	SAFETY	SAFETY	29
45	SAFETY	SAFETY	30
46	SAFETY	SAFETY	31
47	SAFETY	SAFETY	32
48	SAFETY	SAFETY	33
49	SAFETY	SAFETY	34
50	SAFETY	SAFETY	35
51	SAFETY	SAFETY	36
52	SAFETY	SAFETY	37
53	SAFETY	SAFETY	38
54	SAFETY	SAFETY	39
55	SAFETY	SAFETY	40
56	SAFETY	SAFETY	41
57	SAFETY	SAFETY	42
58	SAFETY	SAFETY	43
59	SAFETY	SAFETY	44
60	SAFETY	SAFETY	45
61	SAFETY	SAFETY	46
62	SAFETY	SAFETY	47
63	SAFETY	SAFETY	48
64	SAFETY	SAFETY	49
65	SAFETY	SAFETY	50
66	SAFETY	SAFETY	51
67	SAFETY	SAFETY	52
68	SAFETY	SAFETY	53
69	SAFETY	SAFETY	54
70	SAFETY	SAFETY	55
71	SAFETY	SAFETY	56
72	SAFETY	SAFETY	57
73	SAFETY	SAFETY	58
74	SAFETY	SAFETY	59
75	SAFETY	SAFETY	60
76	SAFETY	SAFETY	61
77	SAFETY	SAFETY	62
78	SAFETY	SAFETY	63
79	SAFETY	SAFETY	64
80	SAFETY	SAFETY	65
81	SAFETY	SAFETY	66
82	SAFETY	SAFETY	67
83	SAFETY	SAFETY	68
84	SAFETY	SAFETY	69
85	SAFETY	SAFETY	70
86	SAFETY	SAFETY	71
87	SAFETY	SAFETY	72
88	SAFETY	SAFETY	73
89	SAFETY	SAFETY	74
90	SAFETY	SAFETY	75
91	SAFETY	SAFETY	76
92	SAFETY	SAFETY	77
93	SAFETY	SAFETY	78
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97	SAFETY	SAFETY	82
98	SAFETY	SAFETY	83
99	SAFETY	SAFETY	84
100	SAFETY	SAFETY	85
101	SAFETY	SAFETY	86
102	SAFETY	SAFETY	87
103	SAFETY	SAFETY	88
104	SAFETY	SAFETY	89
105	SAFETY	SAFETY	90
106	SAFETY	SAFETY	91
107	SAFETY	SAFETY	92
108	SAFETY	SAFETY	93
109	SAFETY	SAFETY	94
110	SAFETY	SAFETY	95
111	SAFETY	SAFETY	96
112	SAFETY	SAFETY	97
113	SAFETY	SAFETY	98
114	SAFETY	SAFETY	99
115	SAFETY	SAFETY	100

SIZE	1.5" STYLE	SIDE PORT OPTIONS		
		2.5" side SIZE - 0° 0°	2.5" side SIZE - 0° 180°	4" PORT - 0° 180°
		PORT - 0° 0°		
NO. OF 4" ELIMINATOR	PORT TO PORT LENGTH - INCHES	MAX SUPPORT PORTS PER MIN.	MAX SUPPORT PORTS PER MIN.	MAX PORT INLET (1/2")
1	1134	160	200	41
1.5	1190	1160	160	45
2	1278	1150	160	51
3	1336	1115	160	54
4	1394	1100	160	55
4.5	1478	1115	200	61
5	1528	1150	200	65
6	1604	1200	200	68
7	1700	1190	200 L	100
7.5	1798	1200	200 L	115

1000

Year	1990	1995	2000	2005	2010
1	100	100	100	100	100

3648	SCALE: NONE	DATE: 11/11/17
DIMENSIONS: 10.00000000		



ASME X 1.25 INCHES
 3/16 INCH THICK

C-CENTRA₄

SIDE PORT OPTIONS		
SIZE	STYLE	
2.0"	2 SAME SIDE - 0°/0°	
2.5"	2 OPPOSING - 0°/180°	
75 1mm	3 PORT - 0°/180°	
	4 PORT - 0°/180°	

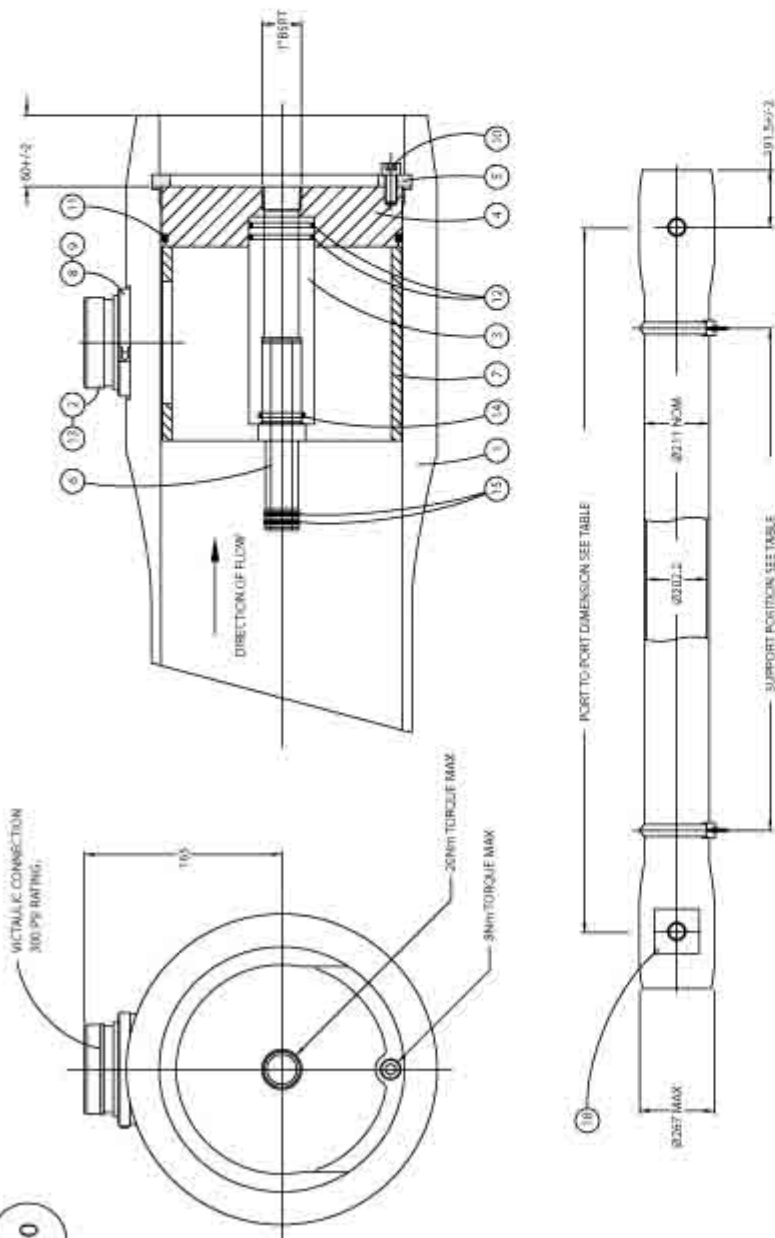
NO. OF 40° ELEMENTS	PORT TO PORT LENGTH (mm)	MAX SUPPORT POSITION (mm)	MIN SUPPORT POSITION (mm)	MAX DRY WEIGHT (kg)
1	1143	740	500	46
1.5	1651	1250	500	51
2	2159	1750	500	56
3	3175	2775	660	67
4	4191	3970	78	78
4.5	4650	4375	2450	84
5	5067	4560	3090	89
6	6223	4020	4020	101
7	7259	5170 C	5000 C	112
7.5	7747	6020 C	5100 C	118

8" PRESSURE VESSEL 300 PSI, SIDE PORT.

18	NAME PLATE	WVVC	1
17	SAUCLE	UBETHANE	2/3
16	STRAP	2MM 1075	2/3
15	O SEAL ADAPTOR	2MM 3025	2/3
14	O SEAL PROCD/ADAPTOR	TO SUIT MEMBRANE	2/4
13	O SEAL FEED/CONC	SIZE 85-210	2
12	O SEAL PROCD END CAP	SIZE 104-188 2.5x76mm	2/3/4
11	O SEAL END CAP	SIZE 85-232 2"	8
10	CAP HEAD SCREW	SIZE 85-223	2
9	PORT CLAMP	SIZE 85-482	2
8	PORT RETAINING CLIP	CMP 1520	2/3/4
7	THRUST RING	CMP 1573 2.5x76mm	2/3/4
6	ADAPTOR	CMP 1574 2"	1
5	RETAINING RING SET	2MM 3061 2.5x76mm	2
4	END CAP	2MM 3575 2"	2
3	FLUB	2MM 3009	2
2	FEED/CONCENTRATE PORT	TO SUIT MEMBRANE	2
1	UPPER BODY	3972	4
		3813	2
		2MM 1058	2
		2MM 1550	2
		2MM 3280 76mm	
		2MM 3290 2.5"	
		2MM 3294 2"	2/3/4
		2MM 3085	1

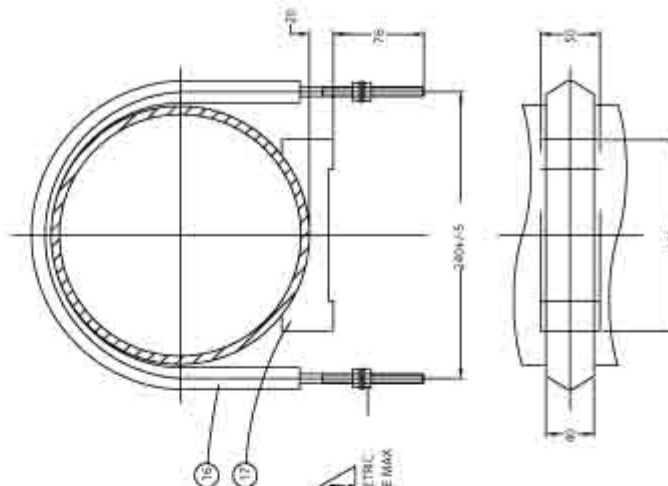
NOTES:

1. GLOUTERME TO BE USED ON ALL SEAL RINGS TO REDUCE FRICTION.
2. TIGHTEN ALL CONNECTIONS TO 30% OF MAXIMUM TORQUE FIGURE PROVIDED. DO NOT EXCEED MAX TORQUE FIGURE.
3. REFER TO USER'S GUIDE FOR MORE DETAILED INFORMATION ON MAINTENANCE, INSTALLATION, OPERATION AND SAFETY.
4. EACH VESSEL TESTED AT:
 - 1.1 TIMES DESIGN FOR 1 MINUTE FOLLOWED BY 1.0 TIMES DESIGN FOR 15 MINUTES TO ENSURE NO LEAKS.
5. DESIGN PRESSURE: 300 PSI
DESIGN TEMPERATURE: 1 TO 45 °C.
DO NOT ALLOW VESSEL CONTENTS TO FREEZE.
6. IF VESSEL SUPPORTS ARE OUTSIDE OF THE RANGE AS RECOMMENDED IN THE TABLE BELOW USE ADDITIONAL SUPPORTS.



NOTES :

1. GLYCERINE TO BE USED ON O' SEAL RINGS TO REDUCE FRICTION.
2. TIGHTEN ALL CONNECTIONS TO 50% OF MAX TORQUE FIGURE PROVIDED. DO NOT EXCEED MAX TORQUE FIGURE.
3. REFER TO USER'S GUIDE FOR MORE DETAILED INFORMATION ON MAINTENANCE, INSTALLATION, OPERATION AND SHIMS.
4. EACH VESSEL TESTED AT:
1.7 TIMES DESIGN PRESSURE FOR 1 MINUTE FOLLOWED BY
1.0 TIMES DESIGN PRESSURE FOR 15 MINUTES TO ENSURE NO LEAKS
5. DESIGN PRESSURE 300 PSI
DESIGN TEMPERATURE 1 TO 45 °C.
DO NOT ALLOW VESSEL CONTENTS TO FREEZE.
6. IF VESSEL SUPPORTS ARE OUTSIDE OF THE RANGE AS RECOMMENDED IN THE TABLE BELOW USE ADDITIONAL SUPPORTS.



▲
MAX 1.25 METRIC
8Nm TORQUE MAX

C-CENTRAL
SUPPORT REQD

SIDE PORT OPTIONS

SIZE	3" MAXIMUM	STYLE	2 SAME SIDE - 0°, 0° 2 OPPOSING - 0°, 180° 3 PORT - 0°, 180° 4 PORT - 0°, 180°
------	------------	-------	---

NO. OF 40" ELEMENTS	PORT TO PORT LENGTH (FT) / MM	MAX SUPPORT POSITION MM	MIN SUPPORT POSITION MM	MAX DRY WEIGHT kg
1	1154	740	500	50
1.5	1700	1250	500	56
2	2210	1750	500	63
3	3226	2775	660	73
4	4242	3190	1070	84
4.5	4710	3375	1480	90
5	5258	3560	1990	95
6	6274	4020	2420	107
7	7250	4570 C	3000 C	138
7.5	7798	5020 C	3330 C	124

8" PRESSURE VESSEL 300 PSI, SIDE PORT.

18	NAMEPLATE	VINYL	1
17	SADDLE	UPE/THANE	2/3
16	STRAP	STAINLESS STEEL NICHROME	2/3
15	O' SEAL ADAPTOR	EPDM	2/3/4
14	O' SEAL PRODUCE ADAPTOR	EPDM	2
13	O' SEAL FEED/CONC.	EPDM	2/3/4
12	O' SEAL HUB/END CAP	EPDM	4
11	O' SEAL END CAP	EPDM	4
10	CAP/HEAD SCREW M10	SIZE BS 4002	2
9	PORT CLAMP	CWP 1520	2
8	PORT RETAINING CLIP	ST 302	2/3/4
7	THRUST RING ASSEMBLY	ZMNC 3448	2/3/4
6	ADAPTOR	ZMNC 3443	1
5	RETAINING RING SET	TO SPLIT NICHROME	2
4	END CAP	3812	4
3	HUB	FIBREGLASS	2
2	FEED CONCENTRATE PORT	ZMNC 1268	2
1	VESSEL BODY	ZMNC 3286	2/3/4
		3480	1

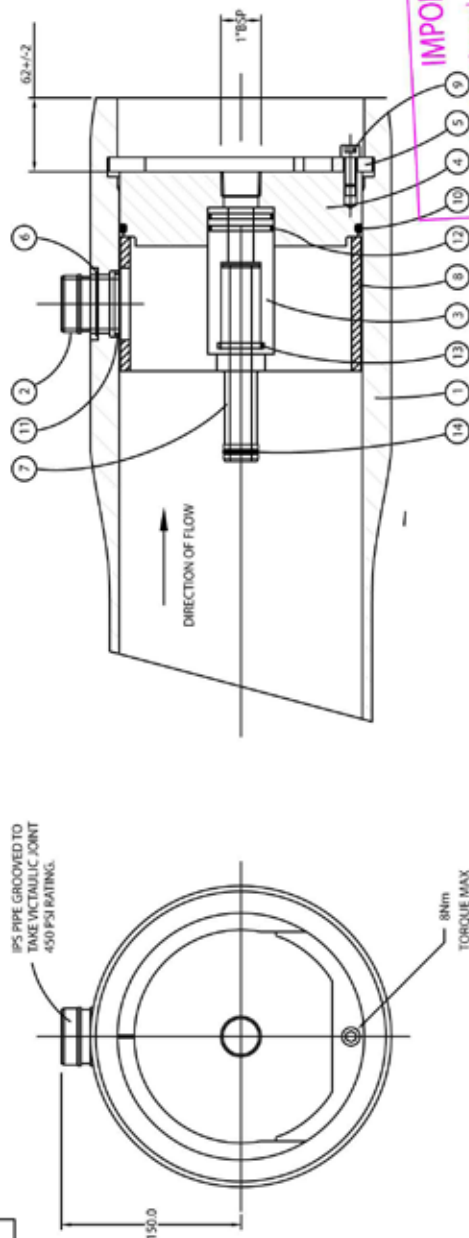
SCALE: NONE

1MNC 3348

DIMENSIONS: MILLIMETRES

ISSUE: D BY: BD APPD: BD

DATE: 17/05/11



ONLY for

IMPORTANT

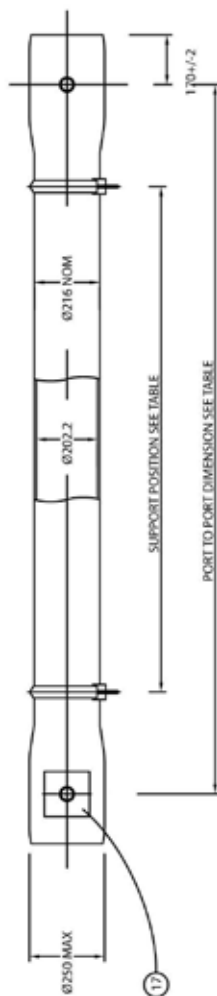
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Table Number PH

Signature _____

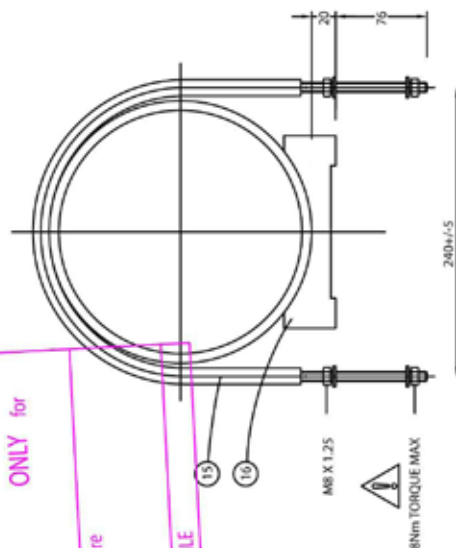
Date _____

TO BE RETAINED IN JOB FILE

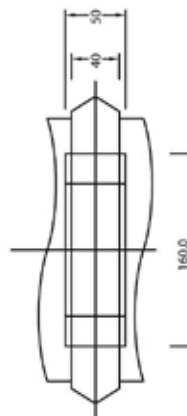


PORT TO PORT DIMENSION SEE TABLE

PORT TO PORT DIMENSION SEE TABLE



— **MIN TORQUE MAX**



SIDE PORT OPTIONS	
SIZE	1.5"
	2.0"

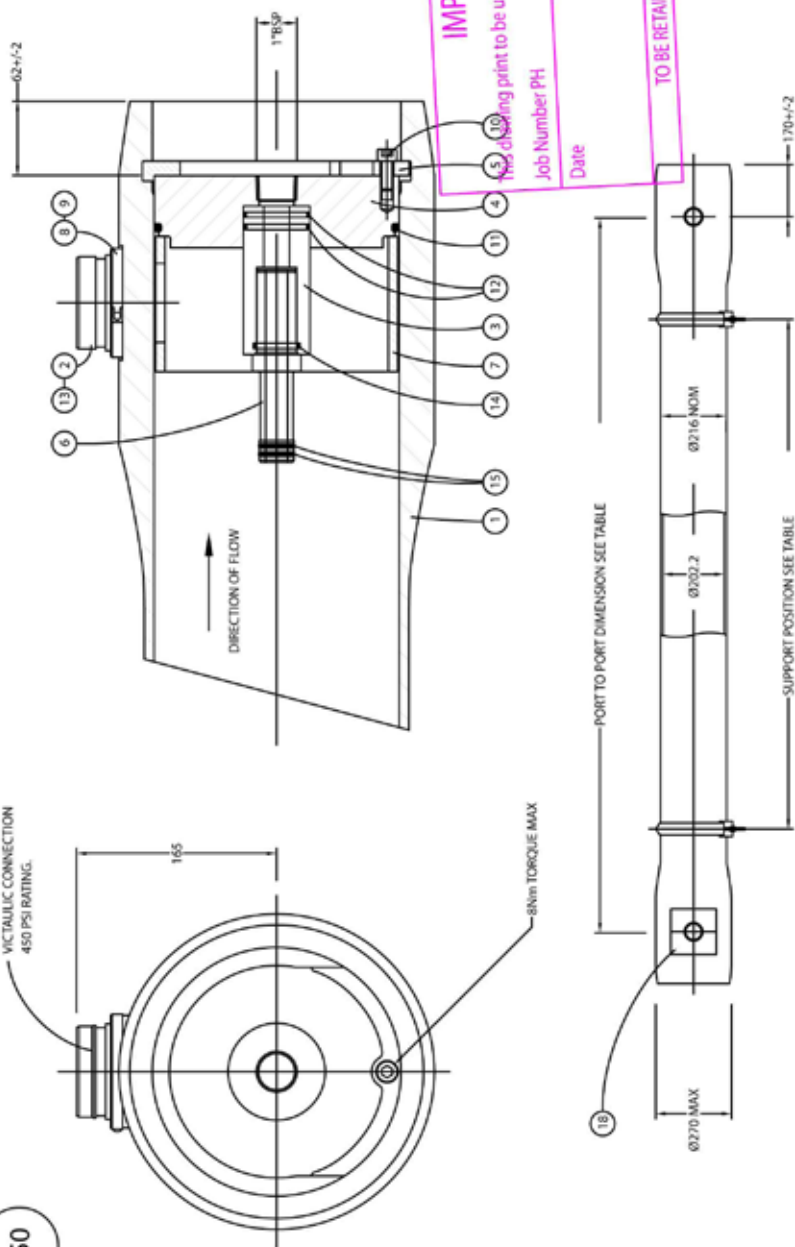
NO. OF 40° ELEMENTS	PORT TO PORT LENGTH ± 1MM	MAX SUPPORT POSITION MM.	MIN SUPPORT POSITION MM.	MAX DRY WEIGHT Kg.
1	1143	740	500	49
1.5	1651	1250	500	54
2	2159	1750	500	59
3	3175	2775	960	70
4	4191	3190	1970	81
4.5	4699	3375	2480	87
5	5207	3560	2990	92
6	6223	4020	4020	104
7	7239	6170 C	5090 C	115
7.5	7247	6290 C	5310 C	121

C-CENTRAL
SUPPORT RECD

ITEM NO.	DESCRIPTION	UNIT	QTY	PRICE	TOTAL
17	NAMEPLATE	VINYL	1		
16	SADDLE	URETHANE	1		
15	STRAP	ST/ST/UPVC	2/3		
14	'O' SEAL ADAPTOR	EPDM	2		
13	'O' SEAL PROD/ADAPTOR	EPDM	2		
12	'O' SEAL HUB/ENDCAP	EPDM	4		
11	'O' SEAL FEED PORT	EPDM	2/3/4		
10	'O' SEAL ENDOREW	EPDM	2		
9	CAP HEAD SCREW	ST/ST GRADE A4	2		
8	THROUST RING	MIDPE OR UPVC	1		
7	ADAPTOR	UPVC	2		
6	SPIROLOCK CIRCLIP	ST/ST 302	2/3/4		
5	RETAINING RING	-GLASS FIBRE	2		
4	END CAP	POLYPROPYLENE	4		
3	HUB	UPVC	2		
2	FEED CONCENTRATE PORT	ST/ST 316L	2/3/4		
1	MPSSEAL BODY	GLASS FIBRE EPDM/BESIN	1		

8" PRESSURE VESSEL 450 PSI, SIDE PORT.

1MNC 3312		SCALE : NONE	
		DIMENSIONS : MILLIMETRES	
ISSUE : G	BY : DG	APPD : DG	DATE : 08.12.11



1. GUYWIRE TO BE USED ON "O" SEAL PATHS TO REDUCE FRICTION.

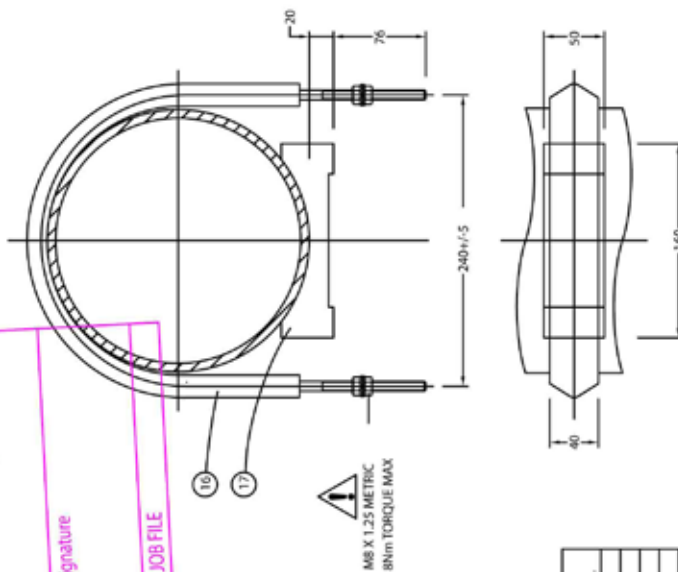
2. TIGHTEN ALL CONNECTIONS TO 50% OF MAX TORQUE FIGURE PROVIDED. DO NOT EXCEED MAX TORQUE FIGURE.

3. REFER TO USERS GUIDE FOR MORE DETAILED INFORMATION ON MAINTENANCE, INSTALLATION, OPERATION AND SPARES.

4. EACH VESSEL TESTED TO ENSURE NO LEAKS AT:
1.1 TIMES DESIGN PRESSURE FOR 1 MINUTE
1.6 TIMES DESIGN PRESSURE FOR 15 MINUTES

5. DESIGN PRESSURE 450 PSI
DESIGN TEMPERATURE 1 TO 45°C.
DO NOT ALLOW VESSEL CONTENTS TO FREEZE.

6. IF VESSEL SUPPORTS ARE OUTSIDE OF THE RANGE AS RECOMMENDED IN THE TABLE BELOW USE ADDITIONAL SUPPORTS.



M8 X 1.25 METRIC
8Nm TORQUE MAX

SIDE PORT OPTIONS	
SIZE	2.0"
	2.5"
	76.1mm

NO. OF 40" ELEMENTS.	PORT TO PORT LENGTH+1/4" MIN.	MAX SUPPORT POSITION MM.	MIN SUPPORT POSITION MM.	MAX DRY WEIGHT KG.
1	1143	740	500	49
1.5	1651	1250	500	54
2	2159	1750	500	59
3	3175	2775	960	70
4	4191	3190	1970	81
4.5	4699	3375	2400	87
5	5207	3560	2990	92
6	6223	4020	3690	104
7	7239	6170 C	5090 C	115
7.5	7747	6220 C	5330 C	121

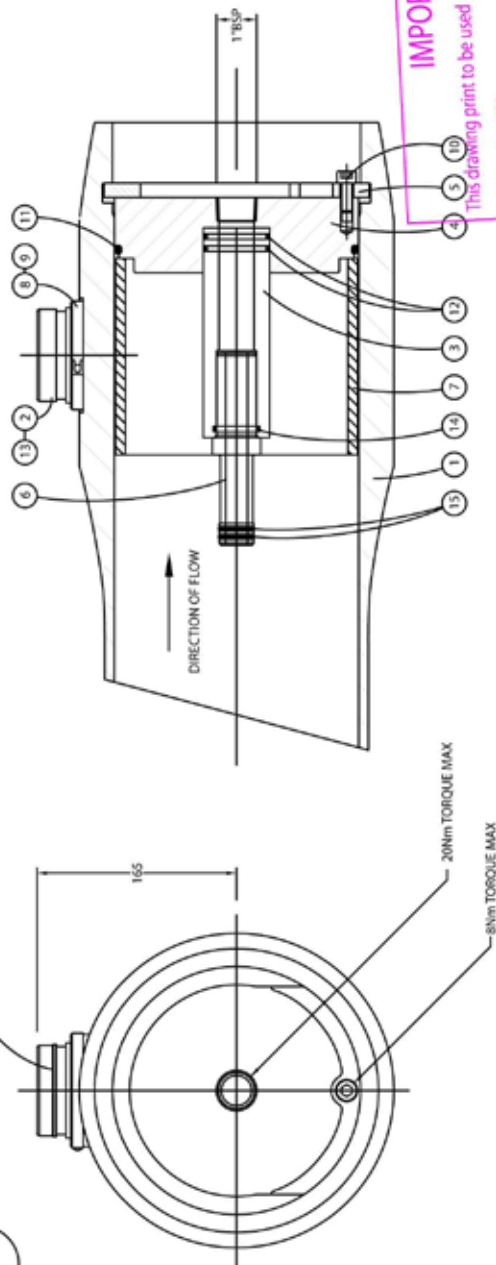
C-CENTRAL
SUPPORT REQD

18	NAMEPLATE	VINYL	1
17	SADDLE	URETHANE	2/3
16	STRAP	STAINLESS STEEL/INCOREL	2/MNC 3426
15	O' SEAL ADAPTOR	EPDM	2/4
14	O' SEAL HUB/ADAPTOR	EPDM	2
13	O' SEAL FEED/CONC	EPDM	2/3/4
12	O' SEAL HUB/END CAP	EPDM	4
11	O' SEAL END CAP	EPDM	2
10	CAP HEAD SCREW M10	ST15T GRADE A4	2
9	PORT CLAMP	ST15T, 302	2/3/4
8	PORT RETAINING CLIP	THERMOPLASTIC	2/3/4
7	THRUST RING	MDPE/NTLON	1
6	ADAPTOR	THERMOPLASTIC	2
5	RETAINING RING SET	GLASS FIBRE	4
4	END CAP	POLYPROPYLENE	2
3	HUB	UPVC	2
2	FEED CONCENTRATE PORT	ST15T, 316L	2/3/4
1	VESSEL BODY	GLASS FIBRE EPOXY RESIN	1

3" PRESSURE VESSEL 450 PSI, SIDE PORT.

1MNC 3605		SCALE: NONE	
		DIMENSIONS: MILLIMETRES	
ISSUE: C	BY: TDP	APPRO: TDP	DATE: 07/07/11

VITRULIC CONNECTION
450 PSI RATING.



NOTES :

1. GLYCERINE TO BE USED ON 'O' SEAL PATHS TO REDUCE FRICTION.
2. TIGHTEN ALL CONNECTIONS TO 50% OF MAX TORQUE FIGURE PROVIDED. DO NOT EXCEED MAX TORQUE FIGURE.
3. REFER TO USERS GUIDE FOR MORE DETAILED INFORMATION ON MAINTENANCE, INSTALLATION, OPERATION AND SPARES.
4. EACH VESSEL TESTED TO ENSURE NO LEAKS AT:
1.1 TIMES DESIGN PRESSURE FOR 1 MINUTE
1.0 TIMES DESIGN PRESSURE FOR 15 MINUTES
5. DESIGN PRESSURE 450 PSI
DESIGN TEMPERATURE 1 TO 45°C.
DO NOT ALLOW VESSEL CONTENTS TO FREEZE.
6. IF VESSEL SUPPORTS ARE OUTSIDE OF THE RANGE AS RECOMMENDED IN THE TABLE BELOW USE ADDITIONAL SUPPORTS.

IMPORTANT

ONLY for

This drawing print to be used

Job Number PH

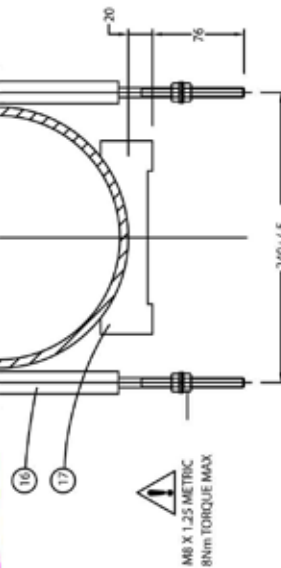
Date

Signature

TO BE RETAINED IN JOB FILE

PORT TO PORT DIMENSION SEE TABLE

SUPPORT POSITION SEE TABLE



MB X 1.25 METRIC
8Nm TORQUE MAX

18	NAME/PLATE	1
17	SADDLE	2/3
16	STRAP	2/3
15	'O' SEAL ADAPTOR	2/4
14	'O' SEAL PROD/ADAPTOR	2
13	'O' SEAL FEED/CONC	2/3/4
12	'O' SEAL HUB/END CAP	4
11	'O' SEAL END CAP	2
10	CAP HEAD SCREW M10	2
9	PORT CLAMP	2/3/4
8	PORT RETAINING CLIP	2/3/4
7	THRUST RING	1
6	ADAPTOR	2
5	RETAINING RING SET	2
4	END CAP	2
3	HUB	2
2	FEED CONCENTRATE PORT	2/3/4
1	VESSEL BODY	1

18	NAME/PLATE	1
17	SADDLE	2/3
16	STRAP	2/3
15	'O' SEAL ADAPTOR	2/4
14	'O' SEAL PROD/ADAPTOR	2
13	'O' SEAL FEED/CONC	2/3/4
12	'O' SEAL HUB/END CAP	4
11	'O' SEAL END CAP	2
10	CAP HEAD SCREW M10	2
9	PORT CLAMP	2/3/4
8	PORT RETAINING CLIP	2/3/4
7	THRUST RING	1
6	ADAPTOR	2
5	RETAINING RING SET	2
4	END CAP	2
3	HUB	2
2	FEED CONCENTRATE PORT	2/3/4
1	VESSEL BODY	1

NO. OF 40" ELEMENTS	PORT TO PORT LENGTH (+/-) MM	MAX SUPPORT POSITION MM	MIN SUPPORT POSITION MM	MAX DRY WEIGHT Kg
1	1194	740	500	56
1.5	1702	1250	500	63
2	2210	1750	500	70
3	3226	2775	960	85
4	4242	3190	1970	100
4.5	4750	3375	2480	107
5	5258	3560	2990	114
6	6274	4020	4020	129
7	7290	6170 C	5090 C	144
7.5	7798	6220 C	5330 C	151

C-CENTRAL
SUPPORT REQD

8" PRESSURE VESSEL 450 PSI, 3" SIDE PORT

SCALE : NONE
DIMENSIONS : MILLIMETRES

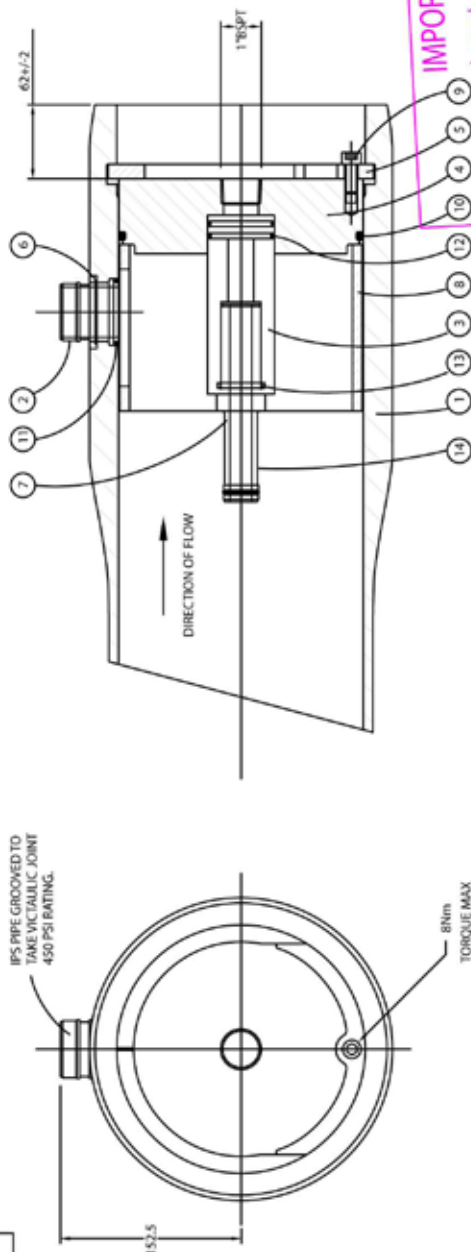
ISSUE : F

BY : DG

APPRO : RM

DATE : 05.09.11

IPS PIPE GROOVED TO
TAKE VICTAULIC JOINT
450 PSI RATING.



NOTES :

1. GLYCERINE TO BE USED ON 'O' SEAL PATHS TO REDUCE FRICTION.
2. TIGHTEN ALL CONNECTIONS TO 50% OF MAX TORQUE FIGURE PROVIDED. DO NOT EXCEED MAX TORQUE FIGURE.
3. REFER TO USER'S GUIDE FOR MORE DETAILED INFORMATION ON MAINTENANCE, INSTALLATION, OPERATION AND SPARES.
4. EACH VESSEL TESTED TO ENSURE NO LEAKS AT :
1.1 TIMES DESIGN PRESSURE FOR 1 MINUTE
1.0 TIMES DESIGN PRESSURE FOR 15 MINUTES
5. DESIGN PRESSURE : 450 PSI
DESIGN TEMPERATURE : -7 TO 45 C.
DO NOT ALLOW VESSEL CONTENTS TO FREEZE.
6. DO NOT ALLOW PERMEATE PRESSURE TO EXCEED 125 PSI AT 45 C.
DO NOT EXCEED 40 Nm WHEN CONNECTING TO PRODUCT TUBE OUTLET THREAD.
7. IF VESSEL SUPPORTS ARE OUTSIDE OF THE RANGE AS RECOMMENDED IN THE TABLE BELOW USE ADDITIONAL SUPPORTS.

ONLY for

IMPORTANT

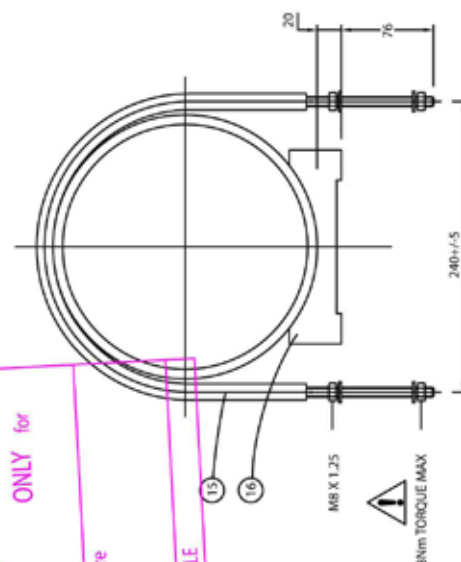
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Date

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SIDE PORT OPTIONS	
SIZE	
1.5"	
2.0"	

17	NAME/PLATE	VINYL	1
16	SADDLE	2MNC 1075	2/3
15	STRAP	2MNC 3426	2/3
14	'O' SEAL ADAPTOR	ST.ST./UPVC	2
13	'O' SEAL PROD/ADAPTOR	EPDM	2
12	'O' SEAL HUB/ENDCAP	EPDM	4
11	'O' SEAL FEED PORT	EPDM	2/3/4
10	'O' SEAL ENDOPLATE	EPDM	2
9	CAP HEAD SCREW	CMP 1520	2
8	THRUST RING	MOPE OR UPVC	1
7	ADAPTOR	TO SUIT MEMBRANE	2
6	SPIROLOC CIRCLIP	ST.ST. 302	2/3/4
5	RETAINING RING	CMP 1950 - 1.5"	2
4	END CAP	CMP 2029 - 2"	4
3	HUB	CMP 2093	2
2	FEED CONCENTRATE PORT	2MNC 3298 - 1.5"	2/3/4
1	VESSEL BODY	GLASS FIBRE EPOXY RESIN	1

NO. OF 40° ELEMENTS	PORT TO PORT LENGTH +/-1MM	MAX SUPPORT POSITION MM	MIN SUPPORT POSITION MM	MAX DRY WEIGHT Kg
1	1194	740	500	49
1.5	1702	1250	500	54
2	2210	1750	500	59
3	3226	2775	960	70
4	4242	3190	1970	81
4.5	4750	3375	2480	87
5	5258	3560	2990	92
6	6274	4020	4020	104
7	7290	6170 C	5090 C	115
7.5	7798	6220 C	5330 C	121

C-CENTRAL
SUPPORT REQD

8" PRESSURE VESSEL 450 PSI, SIDE PORT - VWS

SCALE : NONE
DIMENSIONS : MILLIMETRES

3641

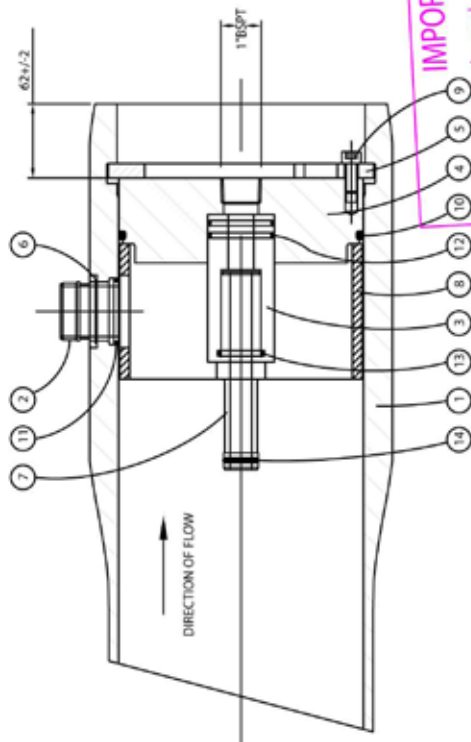
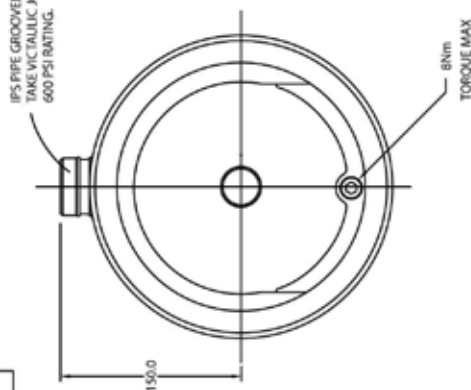
DATE: 18.07.11

BY: DG

APPD: DG

ISSUE: A

IPS PIPE GROOVED TO
TAKE VITALLIUM JOINT
600 PSI RATING.



ONLY for

IMPORTANT

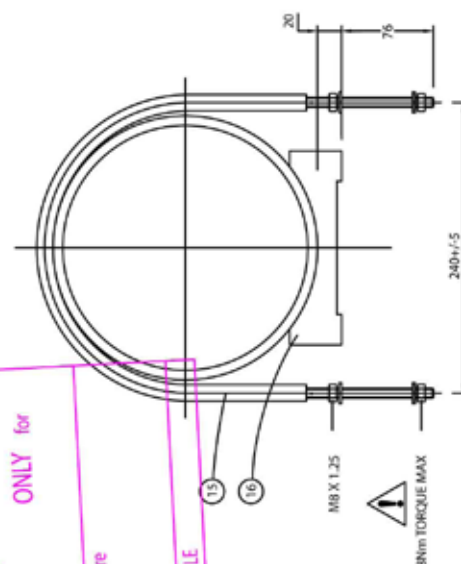
This drawing print to be used

Job Number PH

Date

Signature

TO BE RETAINED IN JOB FILE



SIDE PORT OPTIONS		
SIZE	STYLE	
1.5"	2 SAME SIDE - 0°/0°	
2.0"	2 OPPOSING - 0°/180°	
	4 PORT - 0°/180°	

NO. OF 40° ELEMENTS	PORT TO PORT LENGTH +/- 1MM	MAX SUPPORT POSITION MM	MIN SUPPORT POSITION MM	MAX DRY WEIGHT Kg
1	1143	740	500	49
1.5	1651	1250	500	54
2	2159	1750	500	59
3	3175	2775	960	70
4	4191	3190	1970	81
4.5	4699	3375	2480	87
5	5207	3560	2990	92
6	6223	4020	4020	104
7	7239	6170 C	5090 C	115
7.5	7747	6220 C	5330 C	121

C-CENTRAL
SUPPORT REQD

17	NAMEPLATE	VINYL	1
16	SADDLE	URETHANE	2/3
15	STRAP	ST.ST./UPVC	2/3
14	'O' SEAL ADAPTOR	EPDM	2
13	'O' SEAL PROD/ADAPTOR	EPDM	2
12	'O' SEAL HUB/ENDCAP	EPDM	4
11	'O' SEAL FEED PORT	EPDM	2/3/4
10	'O' SEAL ENDPLATE	EPDM	2
9	CAP HEAD SCREW	ST.ST. GRADE A4	6
8	THRUST RING	214NC 3069	1
7	ADAPTOR	MIPPE OR UPVC	2
6	SPROLOC CIRCLIP	UPVC	2
5	RETAINING RING SET	ST.ST. 302	2/3/4
4	END CAP	CMP 1950 - 1.5"	4
3	HUB	CMP 2029 - 2"	2
2	FEED CONCENTRATE PORT	GLASS FIBRE	2
1	VESSEL BODY	POLYPROPYLENE	2
		UPVC	2
		214NC 3298 - 1.5"	2/3/4
		214NC 3298 - 2"	2/3/4
		GLASS FIBRE EPOXY RESIN	1

C-CENTRAL
SUPPORT REQD

8" PRESSURE VESSEL 600 PSI X4 SF, SIDE PORT.

3615
SCALE: NONE
DIMENSIONS: MILLIMETRES
ISSUE: A
BY: BD
APPD: BD
DATE: 07 SEP 10